

Section 204 Regional Sediment Management (Beneficial Use of Dredged Material)

Detailed Project Report and Environmental Assessment

Galveston Island Coastal Erosion Gulf of Mexico Galveston, Texas



US ARMY CORPS
OF ENGINEERS
Galveston District

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EXECUTIVE SUMMARY

This Study investigated the Beneficial Use of Dredged Material (BUDM) from maintenance of the Federal Navigation Project (FNP), the Galveston Harbor and Channel. This study was authorized by Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326), as amended. The study was requested by and conducted in partnership with the Park Board of Trustees of the City of Galveston, Texas, with major stakeholder, the Texas General Land Office.

Galveston Island is a barrier island between the Gulf of Mexico to the east and the Texas mainland on West Bay 51 miles southeast of Houston. The Galveston study area is on the Gulf of Mexico seaward of Texas Highway 3005 extending from the west end of the 10-mile long Galveston Seawall for five miles to 13 Mile Road. The shoreline development along the study area consists mainly of beachfront homes about 80 feet distant from Gulf waters.

Galveston Harbor and Channel has been maintained by USACE for navigation purposes for over 100 years. Federal maintenance of the navigation channel is carried out periodically with the dredged sand placed into ocean disposal area by hopper dredge. Galveston Island has sustained coastal storm damages and has experienced localized, acute, erosion rates along the beach. The local average rate of shoreline retreat ranges from 2.7 to 5.75 ft/yr.(landward) based on a comparative analysis of historic surveys. The Federal Base Plan for maintenance dredging of Galveston Harbor and Channel is generally in odd year cycles using a hopper dredge. Dredging of the FNP channel provides the opportunity for the BUDM to temporarily delay the Galveston Island beachfront from coastal erosion.

The 2025 maintenance dredging construction season (the base plan) may entail, or in the outyears pending on no adverse impact to the FNP, might provide about 530,000 cubic yards (CY) of beach sand to be removed from the Galveston Harbor and Channel for beach nourishment on Galveston Island from Sunbather Lane west. The beach fill area is about 1.7 miles long by 300 feet wide to result in a 175 berm width after cross-shore spreading loses. This area includes about 155 shorefront structures that could experience coastal erosion during the 2023-2037 without project period. Dredging would be accomplished by a hopper dredge with direct pump-off capability.

An Environmental Assessment, Finding of No Significant Impact, and Clean Water Act Section 404(b)(1) Evaluation were prepared for the Section 204 beneficial use features included with the Detailed Project Report. Construction windows have been established in coordination with Federal and State agencies for protection of aquatic resources (channel dredging) and nesting shorebirds (on-beach placement).

Costs for the Section 204 beneficial use project are measured as the increase in cost for direct beach placement of the dredged sand above the cost of the Federal Base Plan for ocean placement. The fully funded increased cost for construction of the beach nourishment plan is estimated at \$11,740,000. The 35 percent non-Federal share of the §204 project is estimated at \$4,109,000. The 65 percent Federal share for construction is estimated at \$7,631,000 for the purpose of coastal storm risk management.

Benefits for the increased beach fill include delaying the loss from coastal erosion of the private developed properties and non-Federal public infrastructure considered over a 24-year period of analysis. Beach fill losses in the placement area were estimated at over half in year one, approximately 80% by year 5, and 100% loss between years 8 and 10. The annualized incremental construction cost of beach nourishment is \$585,000 annualized. Average annual benefits amount to \$3,289,000 yielding a Benefit- to- Cost Ratio of 5.6 to one. These benefits indicate a positive National Economic Development plan for beneficial use of dredged material to provide coastal storm damage risk reduction in the City of Galveston, Texas.

The analysis indicates that beach nourishment for Galveston Island is feasible, environmentally acceptable, and economically justified. This report concludes that there is Federal interest in proceeding with implementation of a project for the beneficial use of dredged material from Galveston Harbor and Channel under the authority of Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326), as amended. The tentatively selected plan is to bring dredged material to the west end of Galveston Beach using a pipeline for beach placement at Sunbather Lane and extending 1.7 miles to the west.

Implementation of the Section 204 project requires approval of this report and the project, securing all required Federal, State and local regulatory approvals for the modified disposal plan, commitment of funds by the Federal Government and the non-Federal Sponsor, execution of a Project Partnership Agreement between the USACE and the Sponsor, provision of all required easements by the Sponsor for construction and maintaining public access of the beach, preparation of plans and specifications, solicitation of bids, award of a contract that must not adversely interfere with the dredging and navigation of Federal projects, and completion of construction. As of May 3, 2022, the non-Federal Sponsor is the City of Galveston, Texas, along with its partnership with the Texas General Land Office (GLO).

Approval of the report does not guarantee that sand will be placed at the Section 204 beach location. Prior to requesting the project funding, Galveston District will perform market research to determine if capable dredging equipment is available to execute the work (i.e. bid the contract). Because there is no guarantee contractor equipment will be available at the time of the required maintenance dredging and/or funding can be secured, the Galveston Island Park Board, the City of Galveston and the Texas GLO should not rely, solely, on the sand from the Navigation channel to address the problem area at the condominiums. There should be alternative plans in place to address this issue.

The recommendations contained in this report reflect the information available at this time and current USACE Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are authorized for implementation funding.

Galveston Coastal Erosion, Galveston, Texas
§204 Beneficial Use of Dredged Material Detailed Project Report

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Galveston Coastal Erosion, Galveston, Texas
§204 Beneficial Use of Dredged Material
Detailed Project Report

1 Study Information

This Detailed Project Report and Environmental Assessment (DPR/EA) examines the potential for beneficially using a portion of the sand dredged. Galveston Island is a placement site candidate for beach nourishment under the Corps of Engineers beneficial use of dredge material program (§204). The Galveston District of the Corps of Engineers has examined environmental resources as part of the planning and development of the proposed work in compliance with the National Environmental Policy Act (NEPA) of 1969 and appropriate Federal laws, Executive Orders and regulations. This report investigates and evaluates environmental impacts and alternatives considered for the proposed upcoming maintenance dredging and beach sand placement.

The report presents the results of studies to formulate and evaluate alternatives of Beneficial Use of Dredged Material (BUDM) from the maintenance of the Federal Navigation Project (FNP), Galveston Harbor and Channel, Texas, for Galveston Island, Texas. The study was requested by the Galveston Island Park Board of Trustees in concert with the Texas General Land Office (GLO). On May 3, 2022, the City of Galveston became the project NonFederal sponsor in concert with GLO. Two alternatives were costed with the Federal Base Plan of maintenance dredging of the FNP. The incremental cost of BUDM for onshore placement on West Galveston Island beach for temporary delay of erosion damages is for the purpose of coastal storm risk management.

Study Purpose and Authority

November 23, 2020, the Galveston Island Park Board of Trustees, sent a letter to the Galveston District Engineer requesting a study under Section 204 of the Water Resources Development Act of 1992. Sec 204 provides the authority to plan, design, and build projects in connection with dredging of authorized Federal navigation projects. The costs of the Section 204 project are those costs in excess of the costs necessary to carry out the dredging for construction, operation, or maintenance of an authorized Federal water resources project in the most cost-effective way, consistent with economic, engineering, and environmental criteria. The study is conducted at Federal expense. The sponsor understands and agrees with the study and project requirements, including cost sharing. See Attachments 1 and 2.

As the project's incremental federal costs of beach nourishment exceed \$300,000 of the cost of dredging Galveston Entrance Channel Reach (a portion of the FNP), the project's incremental costs must be justified by demonstrating that the project benefits are greater than its incremental costs with a benefit-to-cost ratio of 1.0 or greater. The benefits achieved

are those that would normally be considered in a coastal storm risk reduction project. All the necessary conditions for federal participation, consistent with its project purpose, are to be met. Federal and state resource agencies must support the selected disposal method. The disposal method is subject to appropriate National Environmental Policy Act requirements.

Federal Interest

The Federal Interest Determination (FID) approved by the Southwestern Division Commander on January 19, 2021, indicated federal interest for a beneficial use project on Galveston Island for material placement on the beach from 8 Mile Road extending approximately six miles WSW along the Gulf coast to 13 Mile Road. The Federal interest in the project is indicated as the benefits of temporarily delaying erosion damages to the structures and infrastructure on a section of privately developed coastline on West Galveston Island would be greater than the incremental cost of placing sand dredged from the Galveston Entrance Channel Reach onto the public beach without adverse environmental impacts.

Purpose and Need for the Project

The study purpose is to determine if there is Federal Interest in a Beneficial Use of Dredged Material (BUDM) project for coastal storm risk management on Galveston Island. Beach erosion between 8 Mile Road and 13 Mile Road risks homes and public infrastructure including roads, utilities, and communication networks.

Study Scope

The study scope is for a one-time sand placement (as requested by the sponsor) based on the sand quantity from the required operations and maintenance dredging of the Galveston Harbor and Channel. The length of beach to be nourished is dependent on the quantity of dredged sand and the amount of sand required based on the existing and with plan beach profiles. Sand placement is to temporarily ameliorate the coastal erosion damages for a segment of the island's developed area adjacent to the public beaches.

Study Location and Project Area

Galveston Island is a barrier island between the Gulf of Mexico to the east and the Texas mainland on West Bay 51 miles southeast of Houston. The Galveston Island study area is on the Gulf of Mexico seaward of Texas Highway 3005 from the end of the 10-mile-long Galveston Seawall extending for six miles to 13 Mile Road. The following is a map of the location and the project area. See Figure 1.

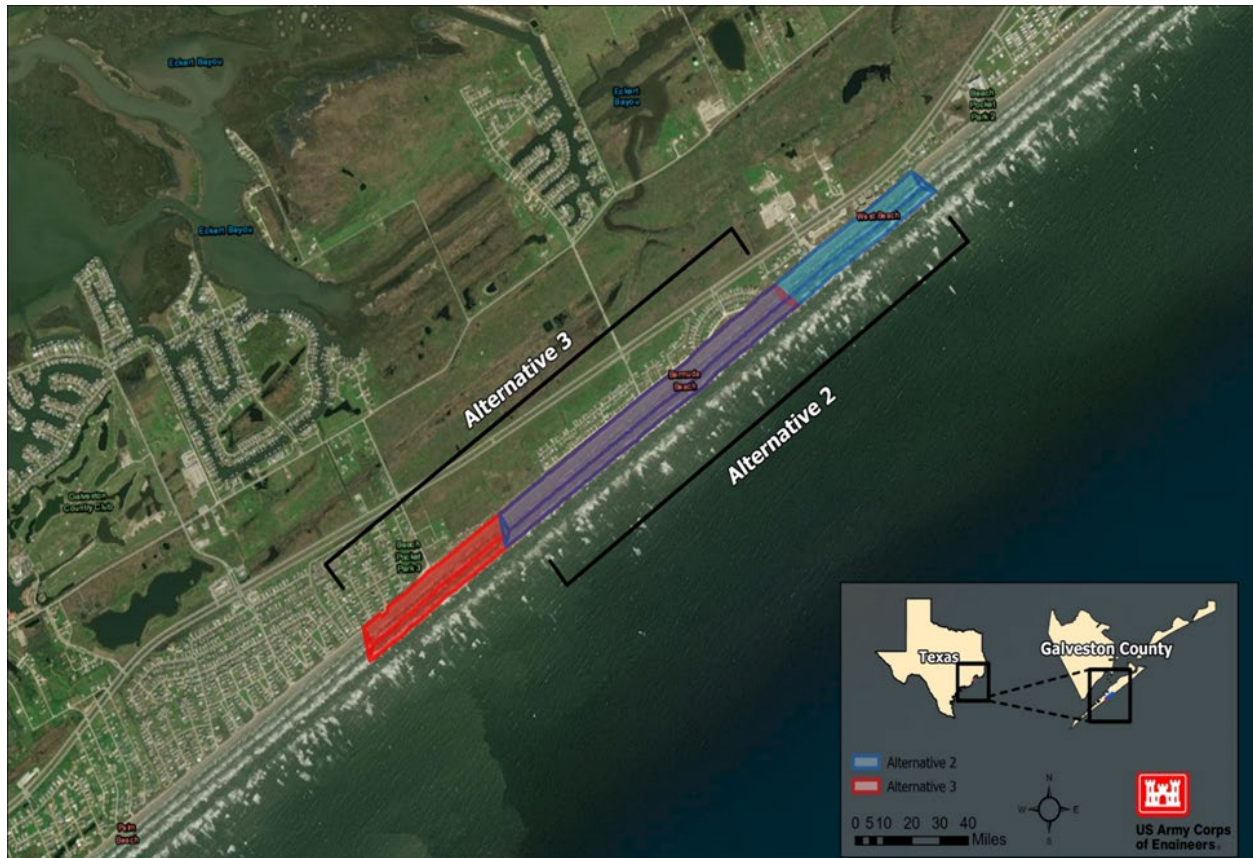


Figure 1. Study Location

Two alternative project areas are shown in the previous figure. Alternative 2 extends from Sunbather Lane for 1.7 miles west. Alternative 3 extends from Hershey Beach Drive for 1.7 miles west to Ghost Crab Lane.

Federal Navigation Project

1.1 Existing Navigation.

The Galveston Harbor and Channel, the Federal Navigation Project, is maintained by the Federal government for navigation purposes. Federal maintenance dredging of the navigation channel is carried out periodically and generally in odd years using a hopper dredge. There is an estimated 530,000 cubic yards of beach quality sand that could be made available for beach nourishment. The sandy dredge material is to be placed by hopper dredge. Some sand placement has previously been done for beach nourishment on Galveston Island further east.



Figure 2. Existing Projects

1.2 Prior Reports and Existing Water Projects.

The municipal Port of Galveston was established by Mexico in 1825. It is on the eastern end of Galveston Island 9.3 miles from the open Gulf. It consists of the Galveston Harbor and Channel, the south side of Pelican Island, the north side of Galveston Island on the Intercoastal Waterway, and the entrance to Galveston Bay. The Houston Ship Channel goes through Galveston Bay with the world's largest number of vessel transits. The Ocean Disposal Material Disposal Site (ODMDS) is shown in Figure 2. Galveston Seawall was constructed in 1902. The current Coastal Texas Feasibility Study plan has the project's CSR (Coastal Storm Risk Management) line seaward for most of the project length. The sediment plan established the landward construction limit for the Coastal Texas Study that includes dunes, which must not extend landward of the CSR line. Construction is expected to occur 12-20 years from today. The City of Galveston has a Sediment Management Plan for which implementation of this study/project is included. The §204 project has the potential to delay erosion towards Highway 3005, an essential evacuation route, and homes prior to the construction of the Coastal Texas project.

1.3 Current Projects

Babe's Beach sand nourishment project (See Figure 2.) provides data to refine project design. Galveston Entrance Channel Reach Operation and Maintenance (O&M) dredging occurred in 2018 under the Harvey Supplemental Program that provided base plan indications of cost;

incremental cost for work done in 2019 was \$8M for BUDM placement. The Entrance Channel O&M dredging in 2021 continued into March 2022; the next award, February 2023 includes placement option for Babes Beach. Galveston Park Board and FEMA have a beach restoration project in planning that will renourish the first 0.35 miles of beach from end of the seawall via truck haul. A GLO project is renourishing one mile of shoreline from the end of the seawall approximately down to 8 Mile Road. The Port of Galveston will have a deepened portion of the Galveston Harbor and Channel to accommodate larger vessels throughout the port that increases capacity, while enabling improved operational safety for a nearly \$11M cost funded in 2022. City of Galveston has requested a permit to construct bulkheads at the Three Towers condos footprint for protection of the foundations. Also, at Bermuda Beach, they are installing Bumper Blades, an anti-submersion system to resist and reduce the destructive impact of submersion waves. The Coastal Texas Protection and Restoration Feasibility Study (USACE, 2021) proposes a large - scale nourishment project requiring large volumes of sand pumped from offshore sources at a higher cost relative to BU of Galveston Entrance Channel Reach material. Project construction is 12- 20 years hence, which proposes an engineered double dune system to provide storm surge protection.

Problems and Opportunities

Coastal erosion and storm events have caused major damage to Galveston's infrastructure, tax base and economy. Beach erosion between 8 Mile Road and 13 Mile Road poses risks to homes and public infrastructure including roads, utilities, communications, and networks. The opportunity exists to provide sand nourishment to a segment of the public access beaches to temporarily alleviate erosion damages to homes and infrastructure of Galveston Island's developed area.

Similar BU nourishment was applied to the nearby Babe's Beach, successfully restoring the once nonexistent beach and preventing costly damage to the Seawall, as seen in the Google Earth aerial imagery below. The imagery shows the beach erosion over time (2006), reaching to the seawall and Texas Highway 3005 (2014) before sand placement in 2016 restored the beach protecting the seawall and highway with resumption of beach erosion in shown in 2018. See Figure 3. Babe's Beach BU Nourishment "Proof of Concept" of the four images taken in 2006, 2014, 2016 and 2018.



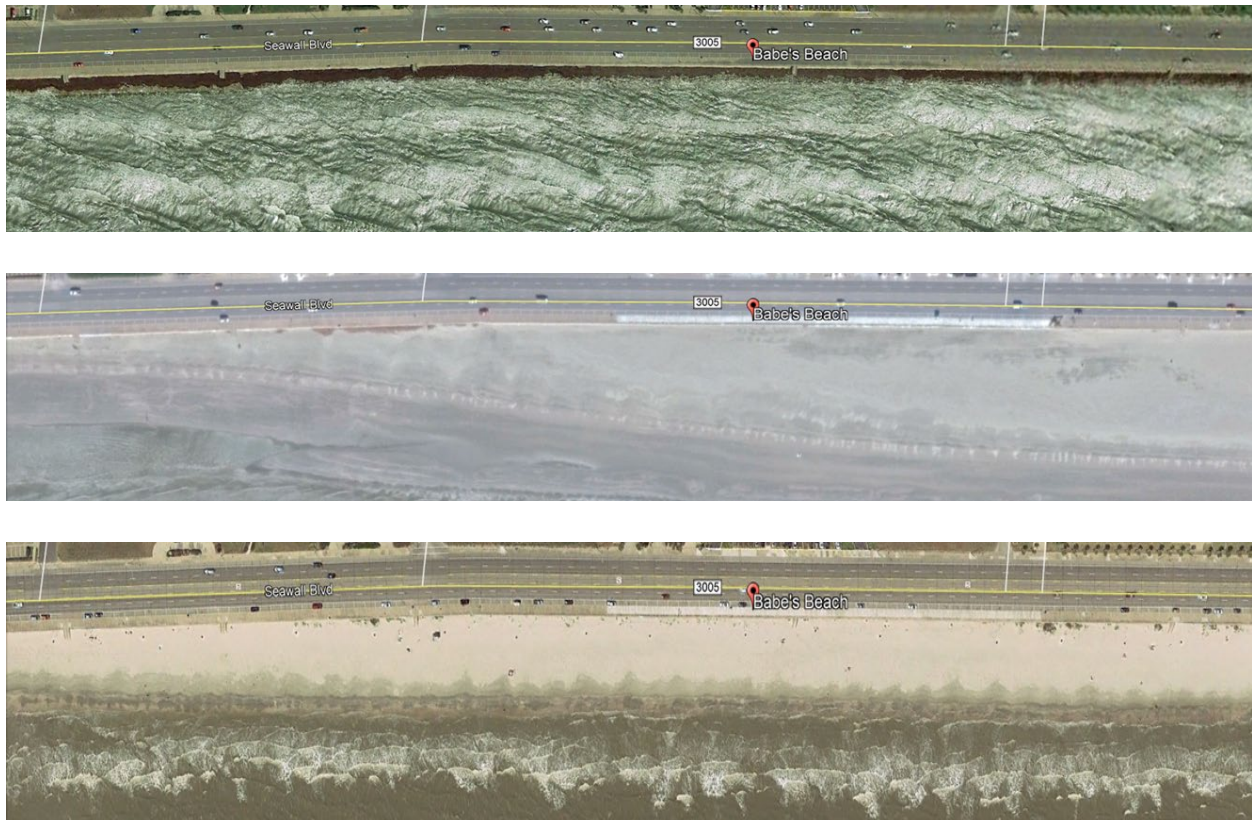


Figure 3. Babe's Beach BU Nourishment "Proof of Concept"

Planning Goals and Objectives

The planning goals for BUDM from the Galveston Entrance Channel Reach to be placed on Galveston Island were developed based on meeting the following objectives:

- Delay temporarily coastal erosion damages to property on West Galveston Island to include homes and public infrastructure.
- Preserve person's life and safety by delaying erosion destruction of homes and threatening the ability of Highway 3005 to function as an essential evacuation route.

Planning Constraints

- Provide an economically efficient solution. The additional cost of onshore material placement to public access beaches must be outweighed by benefits to developed land derived from that placement.
- Benefits at vacant nonpublic lands derived from beach sand placement are not in the Federal interest. These benefits cannot be counted towards Federal project justification.
- Provide an environmentally acceptable solution with minimized impacts to shoreline.
- An estimated 530,000 cubic yards of available dredged sand limits the extent of beach nourishment. This estimate is derived from prior BUDM final dredge quantities, reported

in 2015 and 2019. The 1.7-mile extent of nourishment is estimated through a volumetric comparison of the proposed construction template and 2019 survey data.

- Dredging and fill materials and placement must be monitored to avoid impacts to nesting sea turtles and overwintering shore birds.
- The Federal limit of participation in the design and construction is \$10,000,000.
- The sponsor is responsible for any costs above the Federal expenditure limit.
- At the request of the project sponsor, only one BUDM action will be made.
- Project construction duration is limited to the time it would take to bring the same material to Babe's Beach, Galveston (0.063 days per 10,000 cubic yards).
- All the incremental increase in cost above the base plan is a Sec 204 project cost.
- The Sec 204 project cannot increase any costs to the Federal O&M dredging contract.

2 Existing Environmental Conditions

Air Quality

The Clean Air Act (CAA), as amended in 1990, authorizes the Environmental Protection Agency (EPA) to designate areas as nonattainment, attainment, or unclassifiable and to further classify nonattainment areas according to the degree of severity. Classification, in turn, triggers a set of control requirements designed to bring areas into attainment by their specified date.

According to the Texas Commission for Environmental Quality (TCEQ), Galveston County is in the Houston-Galveston-Brazoria (HGB) Air Quality Control Region (AQCR). In 2015, the EPA revised its primary and secondary national ambient air quality standards for ozone to 0.070 ppm (80 FR 65292). In 2020, the EPA retained the 2015 standards without revision (85 FR 87256), thus Galveston County remains classified as a marginal nonattainment area for the eight-hour standard for ozone with an attainment deadline of August 3, 2021, (80 FR 65292). CAA section 107(d)(1)(A)(i) defines a nonattainment area as, "any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant". The threshold for major source emissions in a marginal nonattainment area is 100 tons per year (tpy). For all other pollutants (i.e., lead, carbon monoxide, nitrogen dioxide, particulate matter, and sulfur dioxide), the HGB is classified as unclassifiable/attainment. CAA section 107(d)(1)(A)(ii) defines an attainment area as, "any area (other than an area identified in clause i) that meets the national primary or secondary ambient air quality standard for the pollutant", while an unclassifiable designation is defined in CAA section 107(d)(1)(A)(iii) as "any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant".

Climate

The climate of the study area is humid subtropical with warm to hot summers and mild winters. The average annual high temperature is about 76 degrees Fahrenheit (°F), with an average summer high of about 91 °F for the months of June, July, and August, and an average annual

winter low temperature of 41 °F. Periods of freezing temperatures are infrequent and rainfall averages about 44 inches annually (National Weather Service 2021). Severe weather occurs periodically in the form of thunderstorms, tornadoes, tropical storms and hurricanes. Additional discussion on historic significant storm events is available in the Engineering Appendix (Appendix A).

Physical Oceanography

2.1.1 Tides, Currents, and Circulation

The normal daily mean tidal range along the project study area is about 0.8 feet, with larger variations dependent upon the wind. During winter, weather fronts out of the northwest are usually accompanied by strong winds that may depress the water surface as much as 4 feet below mean sea level. At other times of the year, predominantly southerly winds, when coupled with higher-than-normal tides (i.e., spring tides), may occasionally and temporarily raise surface water elevations. Large fluctuations in water surface elevation may also occur during tropical storms and hurricanes (USACE 1975).

The predominant wave direction is from the southeast, with the shore-normal direction for waves approaching Galveston Island at approximately 147 degrees azimuth, which is roughly midway between the two most frequent direction. As a result, there is a fairly even split in the directional frequency of wave driven longshore currents. However, seasonal variations in wave magnitude and direction ultimately yield a net longshore transport direction to the southwest. Elevation +4.0 feet (NAVD88) coincides with the approximate (landward) limit of wave runup during typical conditions according to observation of aerial imagery.

Currents are affected by many different factors including wind, waves, thermohalines, tides, and the Coriolis effect. The National Oceanic and Atmospheric Administration's (NOAA) Atlantic Oceanographic and Meteorological Laboratory records daily geostrophic current fields for the Gulf of Mexico. During non-summer months the current along Galveston moves in the same direction as the net longshore current (southwest) at higher magnitudes than in summer months when it shifts to the opposite direction (Johnson, 2008).

2.1.2 Depth of Closure

The depth of closure (DOC) is intended to define the seaward limit of the active profile, which is the theoretical cross-shore extent of sediment movement, beyond which elevation changes are thought to be negligible. Guidance and wave data from the Coastal Inlets Research program (CIRPA) were utilized to calculate the depth of closure in the project area. DOC values were calculated using Hallermeier's equations which yielded an inner DOC at 16 feet and outer DOC at 41 feet. The respective depths define the seaward limits of the littoral zone, and the less dynamic shoal zone.

2.1.3 Relative Sea Level Change (RSLC)

The change in ocean height relative to coastal lands, called relative sea level rise, is a combination of three factors: eustatic sea level rise, local variations in sea level rise, and relative land motion. Eustatic sea level rise is the change in global mean ocean height (global mean sea level [GMSL]) and is primarily the result of increasing temperatures that cause thermal expansion and melting glaciers and ice sheets. Scientific research indicates that GMSL has risen by about 7-8 inches (16-21 cm) since 1900 and could rise between 3.6-7.2 inches (9-18 cm) by 2030 and 15-51.6 inches (30-130 cm) by 2100 (Sweet et al. 2017). Local variations are produced by changes in wind patterns and ocean currents and are minor for the Gulf of Mexico (Nielsen-Gammon et al. 2020). Relative land motion in coastal Texas is dominated by coastal subsidence, or the gradual lowering of land-surface elevation, and is the result of the extraction of groundwater, oil, or gas or increasing sediment loading or infrastructure construction.

The USACE Sea Level Change Curve Calculator (Version 2021.12) is used to project three local RSLC (relative sea level change) scenarios in accordance with ER 1100-2-8162 (USACE, 2013). The historic RSLC rate utilized (0.02106 ft/yr) reflects NOAA's regional rate at the Galveston, TX Pier 21 gauge (8771450). RSLC is projected out to year 2038, which is consistent with the FWOP analysis duration of 16-years (2023 to 2038). Projections are summarized for three scenarios (low, medium and high) with station datums (on NAVD88) projected with intermediate RSLC in Figure 4. The mid-epoch analysis year (1992) is used as the starting year of RLSC projections according to the station's tidal datum analysis period.

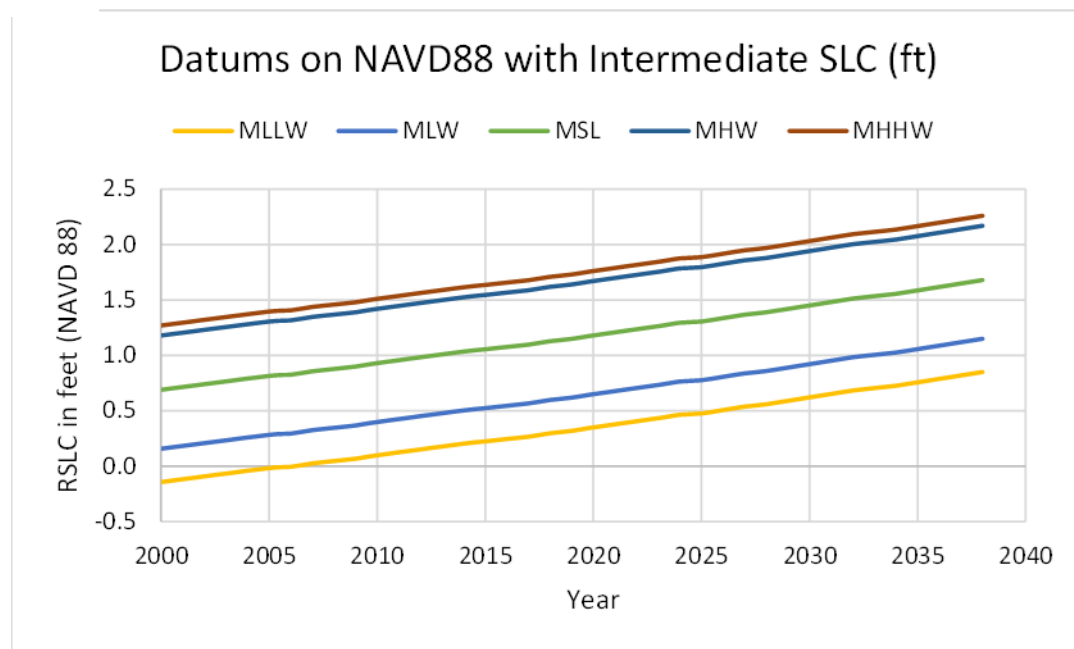


Figure 4. Pier 21 Datums adjusted for intermediate Relative Sea Level Rise

2.1.4 Flooding

The 1-year AEP total WSE (still water elevation + intermediate sea level rise + 2 percent wave runup) is calculated at +4.6 feet NAVD88 and includes all project areas. Structures located proximal to this elevation contour have historically been subjected to “buy-backs.” This is likely because such structures are at immediate risk of exposure to surge and waves during high frequency storms (1 to 5-year AEP storms).

2.1.5 Geomorphology

Galveston Island is in the Quaternary Texas Gulf Coast Plain which formed about 5,500 years ago. After formation, the island advanced seaward by the addition of sand transported from offshore. About 2,600 years ago, the eastern portion of the island became high and wide enough that it ceased to be frequently breached by storms; however, the lower, narrower western portion continued to be periodically over washed. Galveston Island stopped growing about 1,200 years ago. Since then, the island has been diminishing, with relative sea level rise, wash over, erosion from waves, and lack of sand sources contributing to overall erosion and landward migration. The beaches along Galveston Island are extremely dynamic and constantly changing due to daily exposure from wind, waves, and tides. In addition, anthropogenic events such as construction of the Galveston Harbor and Channel and jetties, groin field, and seawall have altered the Galveston shoreline. The beaches adjacent to Seawall Boulevard have experienced a net loss of sediments over time. Although accretion takes place on the east end of the island, the areas on the west end have eroded.

2.1.6 Sediments

Sediment samples from the Texas Coastal Sediment Geodatabase (TxSed), compiled by the Texas General Land Office (GLO), were analyzed to review spatial variation, and estimate median grain size (D50) of native sediment. Based on a total of 42 samples (18 beach and 22 nearshore), the calculated average D50 was 0.156 mm for beach samples and 0.094 mm for nearshore samples. According to the beach equilibrium profile theory, the shape of existing cross-shore (depth of closure) profiles in the project area indicates a theoretical equivalent D50 range of 0.07 - 0.1 mm, which is consistent with collected data.

The particle size distribution curves consistently indicate poorly graded (well sorted) sediment at any given sample location. This is attributed to coastal processes that naturally distribute/sort sediment to varying distances/depths along the cross-shore profile. This natural sorting process is driven by the fall velocity of sand particles, which is largely controlled by the respective grain size. The coarsest sand is concentrated along the surf/swash zone of the beach, where samples are often collected, while finer sand is distributed seaward by waves/current, or landward to dunes via aeolian processes (Benedet 2004).

2.1.7 Shoreline Erosion

The University of Texas BEG (Bureau of Economic Geology) reports shoreline change rates along Galveston Island that range from -16.7 to +81.7 feet per year¹ and a net rate of +3.2 feet per year between 2000 and 2012 (Paine 2020). Long-term historic retreat rates in the project area range from approximately -4.5 to -8.0 feet per year, with erosion rates decreasing from east to west the further from the erosional hotspot located at the end of the seawall (Figure 2). BEG reports a significant reduction to the rate of retreat over the last 19 years in the project area, with local rates being closer to -4.0 to -5.0 feet per year (Figure 3). The rates dropped notably upon the most recent update that accounted for the period between 2012 and 2019, which can be attributed largely to recent nourishments that have effectively reduced the rate of local erosion. It is anticipated that local nourishments will continue biannually into the near future. The estimated erosion rate includes predicted acceleration of erosion due to cyclone storm surge.

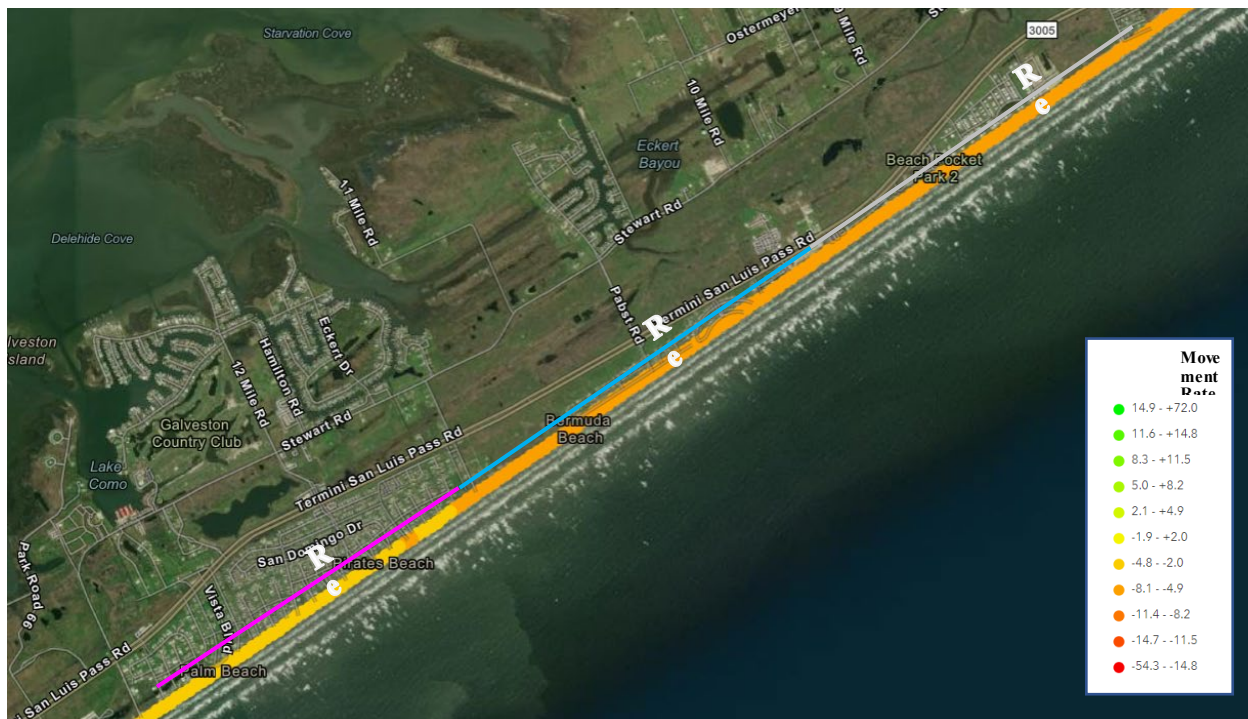


Figure 5. Shoreline Change in the Project Area from 1930s-2019 (feet/year)

¹ Negative values indicate erosion/loss of shoreline and positive values indicate accretion/gain in shoreline area

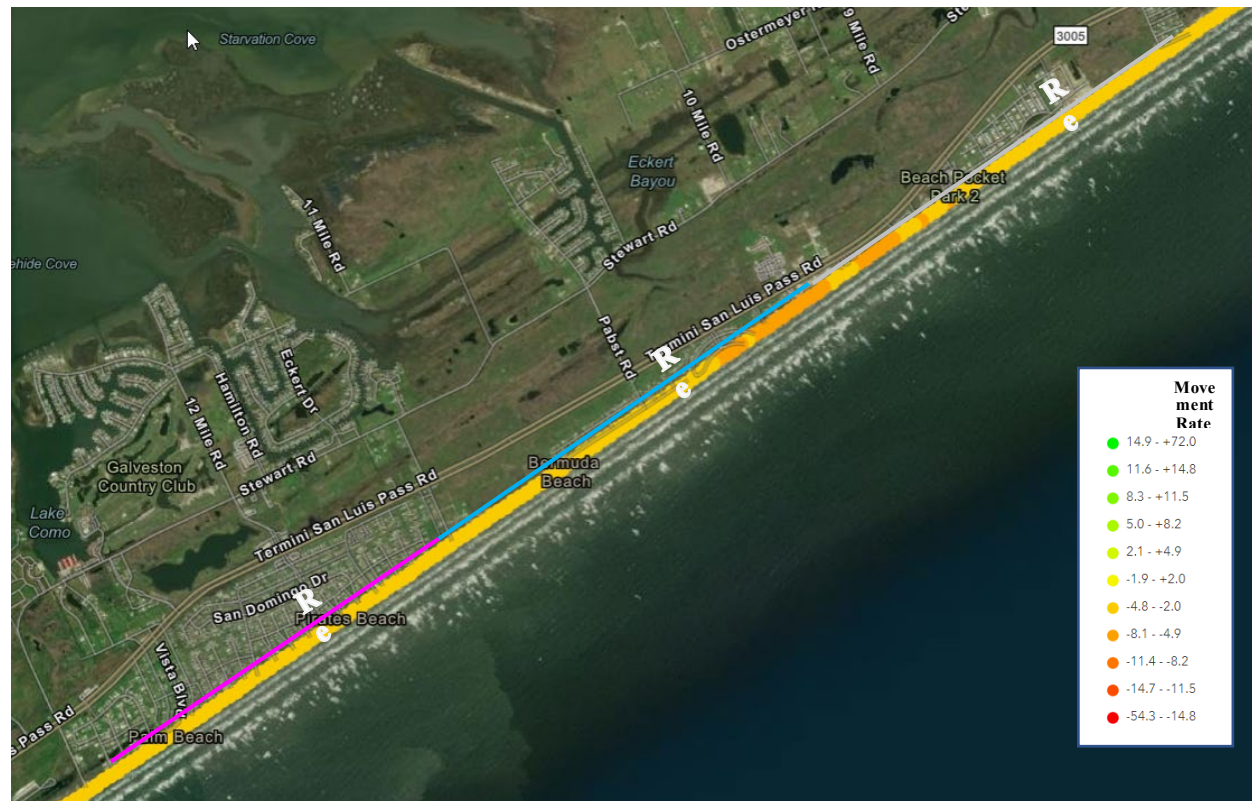


Figure 6. Shoreline Change in the Project Area from 2000-2019 (feet/year)

Water Quality

Section 305(b) of the Clean Water Act (CWA) requires states to assess surface and ground water quality and prepare comprehensive reports documenting water quality, which states submit to the US EPA biannually. In addition, Section 303(d) of the CWA requires states to prepare a list of impaired waters based on Total Maximum Daily Loads of pollutants and specify corrective actions. TCEQ enforces state water quality standards and prepares the state's comprehensive report for submittal to US EPA.

Based on the TCEQ's 303(d) list, segment 2501_03, which includes Gulf of Mexico waters from the Gulf shoreline to the limit of Texas jurisdiction between Bolivar Point to San Luis Pass is designated as exceptional for Aquatic Life Use (ALU); however, this segment is impaired for mercury in edible tissue. Segments 2501GW_01 (Spanish Grant/Bermuda Beach [Beach ID TX 163187]) and 2501GW_04 (Pirates Beach [Beach ID TX 751320]) both have a High ALU designation and have no listed impairments. However, this area is regularly monitored for exceedances in state standards for enterococcus (fecal) bacteria, which occur a couple of times per year.

Biological Communities

The project area lies seaward of the line of vegetation and extends out to the depth of closure in the Gulf of Mexico. This area contains beach habitat that extends to the depth of closure and includes the backshore (berm/dry beach/supratidal), foreshore (extends from the mean low water line to the highest elevation reached by waves at normal high tide/intertidal) and nearshore (area always underwater/subtidal). Beaches are the transition from land to sea.

Aquatic organisms thrive in foreshore and nearshore zones of the beach where sediments are frequently inundated by water, providing important nursery, and feeding habitat for many fish species. Daily flooding by saltwater and moderate- to high- energy waves prohibit plant growth aside from inconspicuous algae in these zones. Backshore areas, those at or just above the high tide zone, are exposed to harsh conditions including fluctuations in temperature and salinity, which preclude habitation by few animals and no plants. The wrack zone, transition between dry beach and surf zone, provides a reservoir of water and food for cryptic nocturnal feeders or species that feed during high tide (e.g., crabs, spiders, beetles), and is characterized by an abundance of arthropods and worms. The wrack zone is also a prime foraging habitat for shorebirds.

Protected Species

2.1.8 Threatened and Endangered Species

Seven federally listed species are known to occur or potentially occur in the project area including: Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), and leatherback sea turtle (*Dermochelys coriacea*), all federally listed as endangered, and the West Indian manatee (*Trichechus manatus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), red knot (*Calidris canutus rufa*), and piping plover (*Charadrius melodus*), all federally listed as threatened.

An additional nine species are listed as potentially occurring in the project area; however, presence is extremely unlikely due to the lack of suitable habitat or the project area is outside the species known range. These include: Attwater's greater prairie-chicken (*Tympanuchus cupido attwateri*), sperm whale (*Physeter macrocephalus*), fin whale (*Balaenoptera physalus*), sei whale (*B. borealis*), and Rice's whale (*B. ricei*), all listed as endangered; eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*), oceanic whitetip shark (*Carcharhinus longimanus*), and giant manta ray (*Mobula birostris*), all listed as threatened, and monarch butterfly (*Danaus plexippus*) listed as a candidate. No critical habitat is designated in the project area. For a more detailed discussion on the habitat requirements, historic and current occurrence, and threats to each species, refer to the Biological Opinion (BO) issued for this study (Appendix C-1).

2.1.9 Migratory Birds

The Texas Gulf coast is an important seasonal pathway for migratory birds and has plentiful habitat for migratory shorebirds and waterfowl. The Galveston beach area is not forested, and

therefore is not an optimum habitat for passerine birds. Rather, it is more suited for wading birds, waterfowl, and shorebirds.

According to the eBird database managed by the Cornell Lab of Ornithology (ebird.org) the most abundant species observed at Bermuda Beach and Galveston Island State Park, the two birding hotspots in or near the project area include:

- Gulls: laughing (*Leucophaeus atricilla*), Bonaparte's (*Chroicocephalus philadelphia*), ring-billed (*Larus delawarensis*), and herring (*L. argentatus*)
- Terns: Caspian (*Hydroprogne caspia*), sandwich (*Thalasseus sandvicensis*), royal (*T. maximus*), least (*Sterna antillarum*), Forster's (*S. forsteri*), and black (*Chlidonias niger*)
- Skimmers: black (*Rynchops niger*)
- Plovers: black-bellied (*Pluvialis squatarola*), snowy (*Charadrius alexandrinus*), and Wilson's (*C. wilsonia*)
- Sandpipers (Waders): willet (*Tringa semipalmata*), western (*Calidris mauri*), sanderling (*C. alba*), and ruddy turnstone (*Arenaria interpres*)

Less common but significant species include the federally listed piping plover and red knot, de-listed brown pelican (*Pelecanus occidentalis*), and state listed white-faced ibis (*Plegadis chihi*).

2.1.10 Essential Fish Habitat

The project area is located in Ecoregion 4 nearshore habitat (60 feet or less in depth and not inside a barrier island or estuary) and includes EFH designated by the Gulf of Mexico Fishery Management Council (GMFMC) for all life stages of cobia (*Rachycentron canadum*) and red drum (*Sciaenops ocellatus*); larvae and juvenile lane snapper (*Lutjanus synagris*); juvenile and adult king mackerel (*Scomberomorus cavalla*); adult gray snapper (*Lutjanus griseus*); larval/pre-settlement post-larvae, late post-larvae/juvenile sub-adult, and adult white shrimp (*Litopenaeus setiferus*); and larval/pre-settlement post-larvae and sub-adult brown shrimp (*Farfantepenaeus aztecus*).

The project area also includes EFH for highly migratory species managed by the National Marine Fisheries Service (NMFS) including: scalloped hammerhead sharks (*Sphyrna lewini*), blacktip sharks (*Carcharhinus limbatus*), bull sharks (*Carcharhinus leucas*), lemon sharks (*Negaprion brevirostris*), spinner sharks (*Carcharhinus brevipinna*), bonnethead sharks (*Sphyrna tiburo*), Atlantic sharpnose sharks (*Rizoprionodon terraenovae*), and finetooth sharks (*Carcharhinus isodon*). EFH in the project vicinity includes sand and shell substrates and water column.

The Gulf of Mexico also supports commercial and recreational fisheries. Commercially landed finfish include black drum (*Pogonias cromis*), southern flounder (*Paralichthys lethostigma*), striped mullet (*Mugil cephalus*), and sheepshead (*Archosargus probatocephalus*). The main commercially harvested shellfish species around Galveston are brown and white shrimp, and blue crabs (*Callinectes sapidus*).

Other commercial and recreational species in the project vicinity may include Atlantic croaker (*Micropogonias undulatus*), spot croaker (*Leiostomus xanthurus*), sea trout (*Cynoscion nebulosus*), and sand trout (*Cynoscion arenerius*). These species are ubiquitous along the Texas coast with seasonal differences in abundance.

2.1.11 Marine Mammals

The common bottle nosed dolphin (*Tursiops truncatus*) is the most likely marine mammal occurring in the nearshore. Other species of dolphins and whales are primarily restricted to deeper offshore waters; therefore, it is unlikely that any of these species would occur in or near the project area.

Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to consider the effects of their undertakings on historic properties. A preliminary assessment of the cultural resources within one kilometer of the project area was conducted using a desktop review of the databases maintained by the Texas Historical Commission and the Texas Archeological Research Laboratory for terrestrial and marine cultural resources as well as the shipwreck and obstruction databases of the National Oceanic and Atmospheric Administration and the Bureau of Ocean Energy Management. There are no recorded cultural resources and no previous cultural resources investigations within the project footprint. The nearest recorded terrestrial archeological site is 41GV71, which is located approximately 800 meters from the project area and will not be affected by the current undertaking. Site 41GV71 is the late 19th Century remains of the town of Nottingham, the Nottingham Lace Factory and the Galveston and Western Railway. Additionally, four possible shipwrecks (S.W. Perry, Sabine, Matagorda, and 41GV168) have been identified between 650 and 1,700 meters of the project area but are not directly offshore from the project area.

Socioeconomics/Economics

Tourism related to the use of the Galveston beach provides an important socioeconomic component for both the City of Galveston and Galveston County. Hurricane Ike and its catastrophic impacts have undoubtedly resulted in at least a temporary decrease in the amount of tourists visiting the Galveston area. Galveston's tourist-driven economy is showing signs of recovery according to recent studies. Newly replenished beaches, world class attractions, and historic venues all contribute to the influx of tourists from across the country. It is estimated that tourism stimulates an \$800 million economic impact to the Island with five million visitors annually; the proposed project would bolster that trend.

The project area spans two census blocks (481677261001 and 48167726001) and covers approximately 8.15 square miles of land and 16.4 square miles of water. The population of the two blocks is 2,428 with 377 individuals (16 percent) identifying as "of color" according to the American Community Survey (ACS) 2014-2018 census reports. Of the 377 individuals, approximately 18 individuals (1 percent) are black, 73 (3 percent) are Asian, 276 (11 percent)

are Hispanic and 13 (1 percent) reporting two or more races. In the census blocks, approximately 410 individuals (17 percent) are 0-17 years old and 563 (23 percent) are over the age of 65. A total of 814 households (70 percent) have a household income greater than \$50,000 per year. Based on these demographics, the project area is not in or near any environmental justice populations.

Noise, Aesthetics and Recreation

The project area possesses generally good aesthetic values along much of the beachfront area. There is mostly residential development behind the narrow-vegetated dune, where it still exists. A couple of resorts and restaurants are also along the beach in the project area. Interspersed amongst the development are large tracts of undeveloped oceanfront lots which improve aesthetics in those areas; however, many of the lots could be developed at any time.

The project area experiences local, state and national recreational use throughout most of the year on beaches locally known as Sunny Beach, West Beach, Bermuda Beach, and Pirates Beach. The backbeach and nearshore waters are used by sunbathers, beachcombers, fisherman, swimmers, snorkelers, surfers, birders, and various types of boaters. Six public access points to the beach are available in the project area.

Hazardous, Toxic and Radioactive Waste

To complete a feasibility level Hazardous, Toxic and Radioactive Waste (HTRW) evaluation, a report was completed following the rules and guidance of ER 1165-2-132: HTRW Guidance for Civil Works Projects and ASTM E1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. The purpose of this search was to identify any sites with recognized environmental conditions (RECs) where hazardous substances or petroleum products have been released or are likely to have been released to soil, groundwater, or surface water in the proposed project area.

A desktop records review was conducted using various sources to determine the presence of HTRW sites on or near the project footprint. This search was focused on active cleanup sites and sites with a reasonable risk of HTRW release. Several databases were searched manually to narrow down the search area. These databases included the Environmental Protection Agency (EPA) Cleanups in my Community database, the EPA Envirofacts database, the TCEQ web map of UST/AST's, TCEQ Central Registry, and the Texas Railroad Commission's (RRC) oil and gas well Public GIS Viewer. The information collected from this desktop records review was analyzed for recognized environmental conditions (RECs) that would affect the proposed project or need further investigation, given the proposed project measures. No Recognized Environmental Conditions were identified within one mile of the project area that could be reasonably expected to affect the project area.

Although not classified as HTRW under USACE regulations, several oil and gas infrastructure sites were identified within the surrounding area. As a result of these findings, pipelines and wells within the project vicinity and along potential site access routes should be precisely

located during PED to ensure no unintended interaction occurs with the existing oil and gas facilities.

3 Future Without-Project Conditions

Future without Project Conditions forecast the conditions expected during the period of analysis if no beneficial use beach fill project is constructed. The future without project condition also provides the basis from which alternative plans are formulated and damages are assessed. This study will forecast the conditions expected at the Galveston Island Beach study area over the twenty four-year period of 2023 to 2048.

Future Without Project Plan (FWOP): Dredged material is deposited in open water (the base plan; has no Federal action for beach nourishment). Beach Erosion and damage to homes and infrastructures is unabated. FWOP plan does not provide BUDM. FWOP does not prevent or delay coastal erosion damages and/or risks to life and property at Galveston Island. The FWOP is compared to Future With Project Plans (FWPP) to determine if there is an economic justification of a FWPP. FWOP is shown below with the estimated annual shoreline retreat of the +4-foot (NAVD88) contour with yellow to red color progression from 2023 to 2038. The FWOP analysis utilizes historically derived shoreline change rates from 2014 – 2019 surveys (supplemented with limited survey from 2006) to estimate future shoreline change between 2023 and 2038. The local average rate of shoreline retreat ranges from 2.7 to 5.75 ft/yr. (landward) based on a comparative analysis of historic surveys. Details of these surveys and the resulting retreat calculations are provided in Appendix A – Engineering Appendix, Hydrology and Hydraulics. See the following Figure 7.

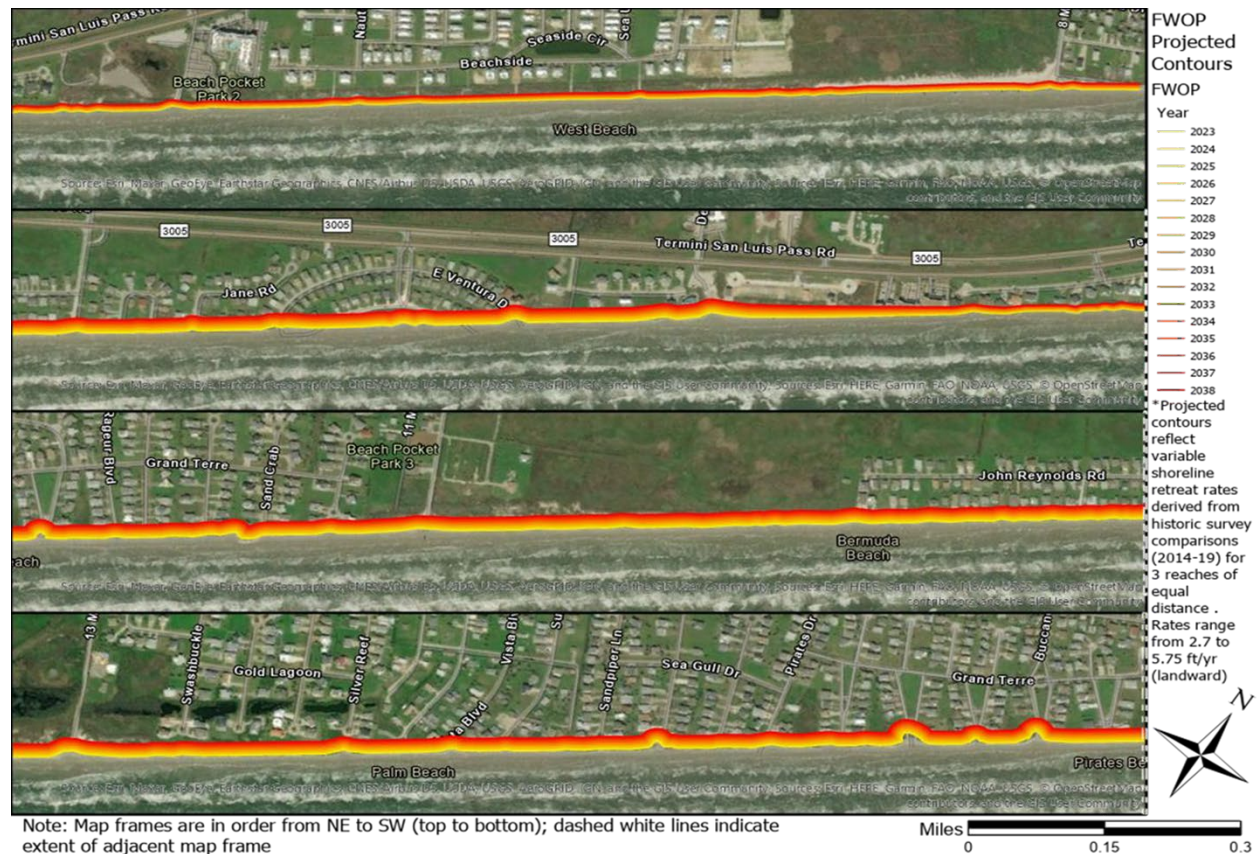


Figure 7. FWOP

Shown above are four contiguous segments of the Galveston Island study area in order from east to west (top to bottom) with shoreline change projections superimposed. Yellow depicts the shoreline in 2023 and the estimated shoreline for 2038 is shown as the red line. Contrary to long-term trends, the eastern ~one-third of the study area has seen a reduction to shoreline retreat, which is largely attributed to recent and ongoing nourishment projects (Babe's Beach, Dellanera, etc.)

4 Future With Project Condition (Future Beach Conditions with Federal Action)

Future with project conditions forecasts the most likely conditions expected during the period of analysis if the selected beneficial-use project, direct placement of sand at Galveston Island is constructed. The future with project condition provides the basis from which benefits resulting from the construction project are calculated. The primary account used to calculate benefits from a storm damage reduction project is national economic development (NED).

This study forecasts the conditions expected through 2048 if the 530,000 cubic yards of available material is placed on the beach rather than in the ocean disposal area during the upcoming maintenance dredging of Galveston Entrance Channel Reach for 2025 or outyears. The analysis evaluated how the project would temporarily prevent or delay

coastal erosion damages to structures and infrastructure over the 24-year (2023-2048) period of analysis. The one-line shoreline retreat results compare well with volumetric loss projections, indicating losses inside the original placement area (construction template) at over half of the original beach fill in year one, approximately 80% by year 5, and 100% loss between years 8 and 10. While statistically derived background erosion rates mitigate some uncertainty inherent in the analytical solutions, analytical projections which form the basis of design here should not be considered representative of actual shoreline evolution. See Figure 8.

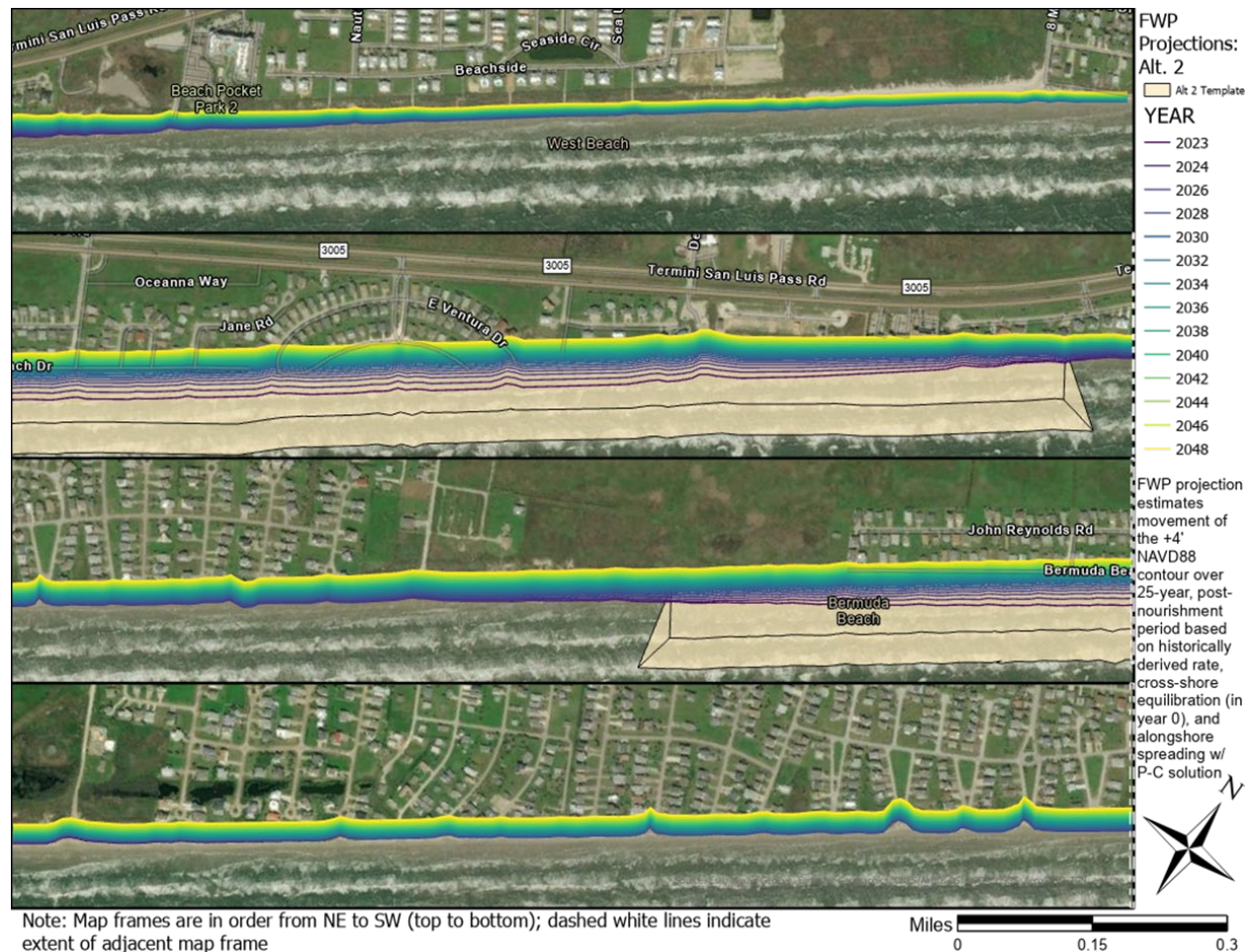


Figure 8. FWP - Alternative 2

4.1 Formulating Alternative Plans

The alternatives were developed to meet the goals, objectives, and constraints for the twenty four-year period of analysis (2023-2048). Management measures developed to alleviate coastal erosion in the study area were Beach Nourishment and Rock Revetments & Dikes (Seawalls with and without Beach Nourishment). Following is the alternative array for which screening resulted in two plans costed for comparison, Alternatives 2 and 3.

4.1.1 Array of Alternative Plans

4.1.1.a. Future Without Project Plan (FWOP), Alternative 1: Dredged material is deposited in opened water (the base plan; has no Federal action for beach nourishment). Beach Erosion and damage to homes and infrastructures is unabated. FWOP plan does not provide BUDM. FWOP does not delay coastal erosion damages and risks to life and property at Galveston Island; thus does not achieve erosion/storm damage reduction goals.

4.1.1.b. FWP Seawall Extension Alternatives 4 & 5: Seawall extension alternatives are not considered feasible for the purposes of this study due to economic, environmental, and engineering concerns. A seawall extension provides robust defense against storm surge, but is not an alternative to beach nourishment, i.e. – erosion will continue seaward of the wall. Required sand application increases reliance/dependence on continued nourishments to maintain a seaward beach that acts as a wave buffer, which may prevent waves from inducing toe scour and exacerbate erosion. See Figure 9 Seawall Extension Alternatives 4 & 5.

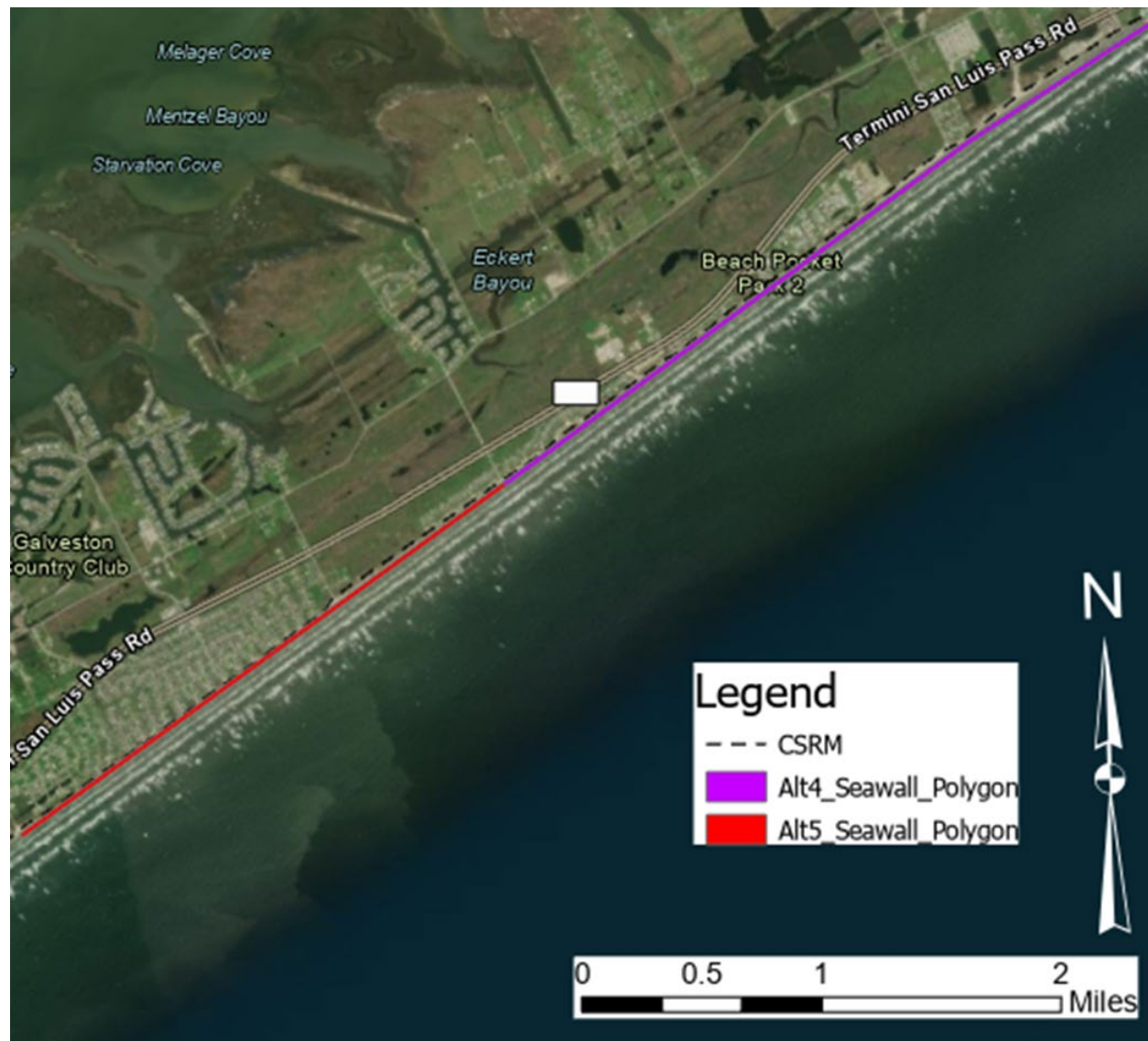


Figure 9. FWP Seawall Extension Alternatives 4 & 5

4.1.1.c. FWP Beach Nourishment, West End of Seawall Alternative 6: This alternative considered delaying erosion by way of westward littoral drift of sand placed seaward of the seawall's west end with a short placement duration to avoid/reduce dredging delays in the Galveston Harbor and Channel. This alternative was screened out as analysis indicated that it would not adequately delay erosion with BUDM placement for the most vulnerable developed properties in the study area (8-Mile to 13-Mile Roads). The one mile of beachfront development at the seawall end to 8 Mile Road that would most benefit by littoral drift from the seawall is scheduled for direct sand placement. Thus, this mile of beachfront would not generate benefits for the Sec 204 project. The Non-Federal Sponsor reconfirmed its objectives for BUDM in the study area on February 17, 2022.

4.1.1.d. FWP Beach Nourishment Alternatives 2 & 3: Alternatives 2 & 3 are differentiated only by their respective location, which amounts to a 3,000-foot shift (along the shore) of the

construction template. These two alternatives were developed following the consideration of the beach erosion between 8 Mile and Thirteen Mile Roads. This approximately 5-mile beach length was subdivided into four segments. The two segments with the most development were selected for further analysis. Based on the existing beach profile and estimated available beach quality sand, it was determined that 1.7 miles of beach could be nourished. Alternatives 2 & 3 were then sited to maximize erosion protection benefits for detailed analysis. The dimensions include a 300-foot added berm width, followed by a 1:20 slope to tie into the existing profile. A three-dimensional version (DEM) of this template is created in GIS, extending the entire length of the project area, which is used to determine total fill requirements by comparing the construction template DEM with the 2019 DEM, using GIS cut/fill operations. The calculations revealed that approximately 1/3 of the total project area length could be covered by 530K cubic-yards of fill material, which is on the lower end of the range of anticipated borrow fill. There is risk that a dredging requirement could arise out of sequence with different quantity availability.

Shoreline change projections estimate movement of the +4-foot (NAVD88) contour, projected annually from 2023 to 2048. The shoreline change curves account for cross-shore equilibration of the construction template profile, statistically derived background erosion, and longshore diffusion of each beach fill alternative. The one-line shoreline retreat results indicate losses inside the original placement area (construction template) at approximately 80 percent by year 5, and 100 percent loss between years 8 and 10, which varies alongshore based on relative proximity to the nourishment location and the background erosion rate.

4.1.2 *Focused Array of Plans*

Two alternatives meet the objective of temporarily delaying coastal erosion damage. The sand placement design goal is a contiguous, uniform shoreline to avoid end losses and induced rip currents to provide benefits to privately owned developed property. Thus, there is a limited placement of material in front of privately owned vacant land to provide project performance at the developed property and to alleviate safety concerns.

4.1.2.a. Alternative 2: Dredged material is brought to the west end of Galveston Beach by Hopper dredge and pipelined to beach for placement beginning at Sunbather Lane and extending approximately 1.7 miles west. Alternative 2 at its eastern end would have direct placement for the most vulnerable developed properties in the study area. See the following Figure 10, Alternative 2.

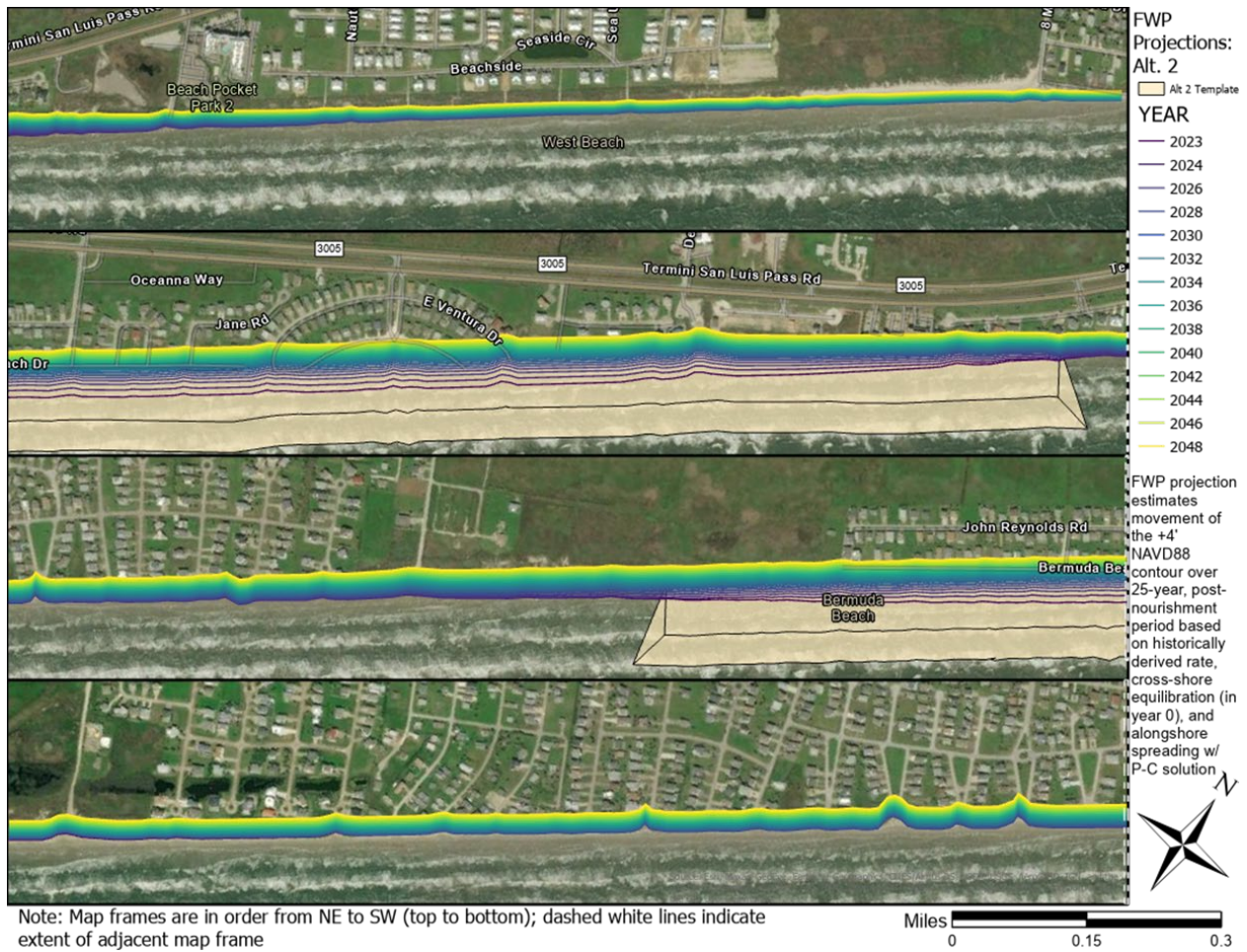


Figure 10. FWP - Alternative 2

4.1.2.b Alternative 3: Dredged material is brought to the west end of Galveston Beach by hopper dredge using a pipeline for beach placement beginning at Hershey Beach Drive and extending approximately 1.7 miles west to Ghost Crab Lane.

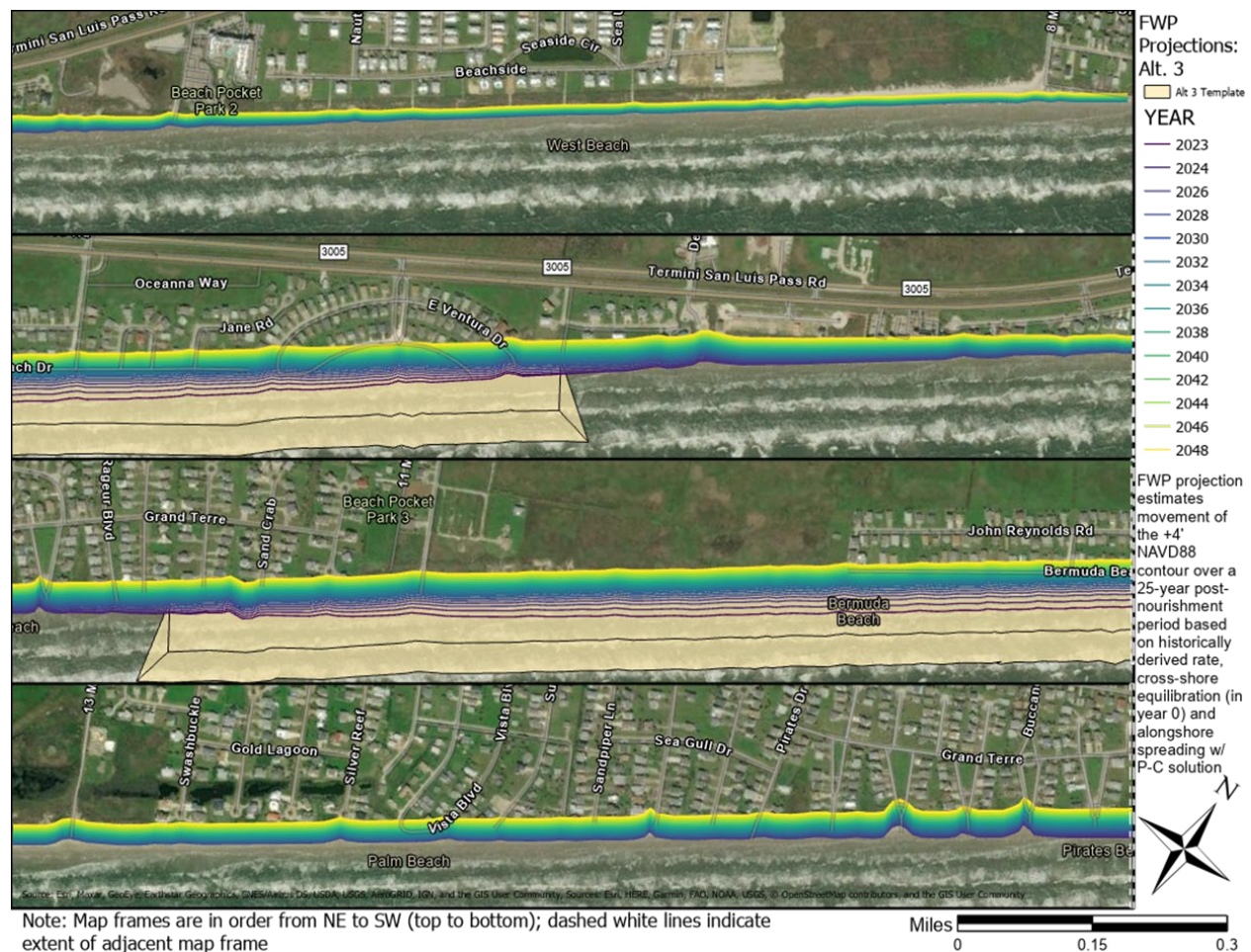


Figure 11. FWP - Alternative 3

4.2 Evaluation and Comparison of Array of Alternative Plans

Criteria for comparing alternatives includes: Costs, Benefits, Objectives, Constraints, Completeness, Effectiveness, Efficiency, Acceptability, and Environmental Impacts.

4.3 Environmental Consequences of Alternatives

Described are the probable effects or impacts of implementing the No Action/Future Without Project (FWOP) and the action alternative (i.e., the Future with Project condition or FWP). Effects can be either beneficial or adverse and are considered over a 24-year period of analysis (2023-2048).

The No Action Alternative is the most likely condition expected to occur over the 16-year planning horizon in the absence of the action alternative. In this case, the No Action Alternative means that dredged material would not be beneficially used to nourish the beach between Sunbather and Ghost Crab Lanes. Federal Operations and Maintenance dredging of the Galveston Entrance Channel Reach would occur according to the Federal Standard and placement of material following would be in an offshore disposal site. The Ocean Disposal Material Disposal Site (ODMDS) is shown in Figure 2.

The No Action Analysis includes a brief impact analysis of reasonably likely projects (e.g., projects funded for construction or for which a decision document is available but is awaiting funding) that are expected to modify the existing conditions of the project area. It is assumed that all other projects that are ongoing in the study area would continue as planned but would not directly affect the project area and are therefore not discussed in the No Action analysis.

The Action Alternative is the TSP (Alternative 2), which involves beneficially using dredged material to nourish approximately 1.7 miles of beach. It is assumed all sediment needs for implementation of Alternative 2 would come from material dredged from the Galveston Entrance Channel Reach. The sediment needs would be met using existing operations and maintenance dredging and would not induce additional dredging beyond the Federal Standard.

Unless otherwise indicated, the impacts of dredging material are assumed to be identical under the No Action and Alternative 2 and will not be discussed herein. The impacts of O&M dredging and material have been accounted in its NEPA documentation and are incorporated by reference. This analysis will focus on the transportation and placement of dredged material to the Federal Standard location (No Action) or onto the beach (Alternative 2).

When considering impacts, it was assumed that, at a minimum, best management practices (BMPs) identified throughout this chapter would apply during project construction. Assumed BMPs are based primarily on widely accepted industry, state and federal standards for construction activities. Examples include but are not limited to:

- Use of silt fencing to limit soil migration and water quality degradation;
- Refueling and maintenance of vehicles and equipment in designated areas to prevent accidental spills and potential contamination of water sources and the surrounding soils;
- Limiting idling of vehicles and equipment to reduce emissions;
- Limiting ground disturbance necessary for staging areas, access routes, pipeline routes, etc. to the smallest area necessary to safely operate during construction and restoring staging area and access routes to result in no permanent loss;
- Minimizing project equipment and vehicles transiting between the staging area and restoration site to the greatest extent practicable, including but not limited to using designated routes, confining vehicle access to the immediate needs of the project, and coordinating and sequencing work to minimize the frequency and density of vehicular traffic.

- Minimizing use of construction lighting at night and when in use, directing lighting toward the construction activity area and shielding from view outside of the project area to the maximum extent practicable.

If, for some reason, the BMPs are not implemented, the impacts of any of the action alternatives would only minimally increase from those described in this chapter. The increase in impacts would not be substantial enough to cause an adverse insignificant impact to become significant.

Air Quality

No Action

Under the Federal Standard, transport of dredged material to the offshore disposal site would result in direct, short term adverse impacts to ambient air quality from construction activities associated with dredging, transport, and placement of material into the site. Dredged material would be transported by the dredge vessel approximately 5 miles. Dredging operations are not below *de minimus* and as a result have received a General Conformity Determination.

Alternative 2

The action would have direct, short term adverse impacts to ambient air quality from construction activities; however, no long-term adverse or beneficial impacts are expected because the project does not involve construction of permanent emission-emitting structures. Short-term air emissions would be mobile in nature, temporary, and localized to the nourishment area being worked at that time and any required booster pump locations and cease upon completion of construction actions. Operation of booster pumps, heavy equipment, support vehicles, vessels, and other motorized machinery for construction would result in combustion of fossil fuels and the release of volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO), ozone (O₃), sulfur dioxide (SO₂), and particulates (PM₁₀ and PM_{2.5}).

In addition to BMPs already listed at the beginning of the chapter, the following BMPs would further reduce air quality impacts and should be incorporated when developing contract specifications: the use of heavy machinery should be fitted with approved muffling devices that reduce emissions; maintain and tune engines per manufacture's specifications to perform at EPA certification levels, prevent tampering, and conduct inspections to ensure these measures are followed; and consider alternative fuel and energy sources (e.g. natural gas, electricity, etc.) when and where appropriate. Using higher tier equipment can further reduce emissions and should be considered when possible; however, it is recognized that using this equipment may contribute to higher costs or limited availability of such equipment.

Existing beach nourishment actions along Galveston Island (DA Permit #SWG-2000-02888) were analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. For that project, it was determined that approximately 10.5 miles of beach nourishment and associated activities, including dredging in offshore and upland borrow locations, would not exceed *de minimis* levels of direct or indirect emissions of any criteria

pollutant or its precursors. In comparison, Alternative 2 is significantly smaller in scope and does not involve any new dredging; therefore, it is also anticipated that direct and indirect emissions of the action would not exceed de minimis for any criteria pollutants or its precursors and is exempt from General Conformity Regulations.

Alternative 2 would result in higher emission rates than the FWOP/No Action due to longer transport vessel distances for the beach placement, but would be within conformity regulations.

Climate

Climate impacts are analyzed from two perspectives: impact of implementing any of the action alternatives on climate and climate change and the impact of climate change on the performance of any of the action alternatives.

NEPA does not specify significance thresholds that may be used to evaluate the effects of a proposed action on global climate. The appropriate approach to evaluating a project's impact on global climate under NEPA is in a state of flux. Current guidance is to follow the Council on Environmental Quality (CEQ) guidance released in August 2016, which recommends 25,000 metric tons CO₂ equivalent (MTCO_{2e}) of direct emissions per year be used as a presumptive threshold for analysis and disclosure within NEPA documents. The guidance suggests that if a proposed action would result in direct emissions below this threshold, the emissions would not be relevant to and would not need to be discussed within a NEPA analysis.

At the state level, GHGs are a regulated pollutant under the PSD program when emissions exceed the thresholds set in 30 TAC 116.164(a)(1) or (a)(2). The threshold for new source emissions is: the project emissions are above the major source threshold for a regulated pollutant that is not GHGs and will emit or have the potential to emit 75,000 tons per year (tpy) or more CO_{2e}. Emissions of GHGs are regulated and require authorization only when the project emission increases are above this thresholds. None of the alternatives would exceed any non-GHG thresholds and would emit far fewer tpy CO_{2e} than the regulated amount.

No Action

Construction Activities

Under the No Action, no construction activities are anticipated in the project area, so there would be no emission of greenhouse gasses (GHGs).

Alternative 2

During construction, combustion of fossil fuels while operating on- and off-road mobile sources would result in the emission of GHGs. The primary GHGs generated during construction are CO₂, CH₄, and N₂O. The other GHGs such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are typically associated with specific industrial sources and processes and would

not be emitted during construction. After construction is complete, all GHG emissions would cease and the area would return to baseline conditions. There are no apparent carbon sequestration impacts that would result from implementation, thus the total direct and indirect impacts would be constrained to very small increases in GHG emissions to the atmosphere from operation of on- and off-road mobile sources. Performance under RSLC is discussed in Physical Oceanography, Relative Sea Level Change below for Alternative 2].

Physical Oceanography

Tides, Currents and Circulation Patterns

No Action

Under the No Action, currents and circulation patterns would not be expected to change. As the beach narrows and shoreline loss occurs, the high tide line is expected to move further landward than where it is under the existing condition.

Alternative 2

Under Alternative 2, a wider beach will cause waves to break further from the shoreline, weakening their force before they reach the shoreline itself, thereby helping to protect the existing dune and properties from erosion, decreasing flooding potential and limiting how far ashore storm surge will go. Since this is a one-time placement, the changes to wave breaking would be temporary and return to the existing condition at the end of the project life (about 10 years). Placing dredged material into the nearshore over a large area would not be expected to change the currents, circulation patterns, or tides due to the relatively minimal change in bathymetry (~2 percent slopes and less than a 5-foot max elevation increase).

Beach nourishment would not impact regional hydrology. The placement of sediments on the beach may have very localized effects on where rainfall runoff flows but would not block or interfere with any existing stream channels or other permanent inland waterbodies. No long-term or spatially extensive impacts to watershed hydrology are anticipated.

Relative Sea Level Change

No Action

The impact of RSLC in the project area is discussed throughout the environmental consequences section of this DIFR-EA. In general, RSLC is anticipated to continue increasing at 0.02096 feet/year. At the end of the assumed maximum project benefit period, the water levels are projected to rise 0.82, 1.01 and 1.60 feet relative to NAVD88 for the low, intermediate, and high scenarios, respectively.

Alternative 2

Sea level rise is accounted for in the advance fill volume, which also includes contributions from background erosion, end loss and overfill. Because this action is a one-time nourishment in the near future and a relatively short project life, any beneficial impacts of nourishing the beach to combat sea level rise are unlikely to be realized.

Flooding**No Action**

Storms represent the extremes in flooding risk and potential damage to the project area under the existing condition and into the future. As erosion continues to encroach on any dunes and degrade it, storm surge events are more likely to overtop dunes in more frequent events. At some point in the future, the narrow beach and degraded dune may not prevent tidal flooding during high-tide resulting in nuisance flooding occurring more frequently on a bi-monthly or even daily basis in lower-lying areas. As sea levels rise, the concern with more frequent flooding will only increase. It is reasonably likely that a hardened structure would be proposed to combat the problem at some point in the future.

Alternative 2

Executive Order 11988 requires evaluation the proposed project's potential effects on a floodplain. The project is located on a "developed" barrier island and it has not been designated as a protected area. The nourishment of the beach will not create any new structures that will be threatened by flooding, nor will it result in increased development or threats to human safety, health and welfare. Slowing coastal erosion through renourishment of the beach will provide a more stable beach, reduce the impacts of erosion on any dune, and assist in preventing damage to existing infrastructure behind dunes from storm events.

The project is in the base floodplain (100-year floodplain) and has been evaluated in accordance with Executive Order 11988. Relocation of the project outside the floodplain would not be responsive to the purpose and need of the study and was not considered further. The risk of inducement is normally associated with structural projects such as levees and floodwalls where vacant parcels are no longer subject to frequent flooding, lowering the cost of potential development and providing economic incentive for the addition of inventory to the floodplain. Potential floodplain development as a result of implementing Alternative 2 would be negligible and not likely a factor in deciding to build or rebuild, especially since this would be a one-time nourishment, only provide benefits for up to 24 years, and would not protect against higher storm surge events.

Beach nourishment would have temporary beneficial impacts to natural floodplain values by increasing the width of the beach and attenuating wave energies further from the development. No loss of natural and beneficial floodplain values is anticipated and the project is not expected to measurably change the base floodplain.

Geomorphology

No Action

Under the No Action, current longshore sediment deficits would likely continue to increase at the observed rate resulting in associated shoreline loss similar to losses experienced over the last decade. Areas outside the project footprint where beach nourishment is ongoing is expected to continue similar to historic rates or that which has been approved through the regulatory permit issued to the Galveston Island Parks Board.

Sediments dredged from the Galveston Harbor and Channel (GHC) would be placed into an offshore location beyond the depth of closure. As a result, approximately 530,000 cubic yards of sediment would be permanently removed from the sediment budget along the coast.

No changes to geology or soil is anticipated under the no action.

Alternative 2

Implementation of Alternative 2, would reintroduce sediments into the system through placement of dredged material directly on the beach and in the nearshore area. After placement, the sediments would behave as the existing substrate and would be seasonally transported on and off the beach as long as it remains in the littoral cell. A wider beach would increase the available sacrificial land which would allow for wave attenuation and a temporary reduction in erosion and shoreline loss. After all sacrificial lands have been removed (between year 8 and 10 post-construction), shoreline erosion and sediment movement would return to the existing condition of eroding at four to five feet per year.

Given the limited availability of naturally sourced sand, it is important to utilize any locally sourced (dredged) beach-quality borrow fill for nourishment purposes. Beneficially using the material retains the sediments in the sediment budget and over the long-term is more cost-effective than extracting sediments from an offshore placement area and returning them to the system such as proposed under other projects (e.g., Coastal Texas Protection and Ecosystem Restoration Study).

No significant effect on the geology or soils in the region are anticipated. Sediments dredged from the Galveston Harbor and Channel have been tested for contaminants and to date there is no indication of concern.

Best management practices which apply to beach nourishment activities include:

- use of beach quality sand consistent in grain size, color, and composition as the existing beach and free of hazardous contaminants
- placement of a gradual slope to minimize scarping; and
- restoration of all project sites to pre-construction slope or contours and all ruts leveled.

Water Quality

No Action

Soils in the study area are highly susceptible to erosion leading to shoreline instability and excessive amounts of sediment inputs into the nearshore, which increases turbidity and can have an adverse effect aquatic life and fisheries and restrict light penetration necessary for photosynthesis by aquatic plants. The nearshore environment in the project area is subject to periodic increases in turbidity resulting from storms and wave activity and often exceeds the State water quality standards of 300 milligrams per liter of total suspended solids (TSS). As a result, the biological communities found in the nearshore are comprised of stress tolerant species. Turbidity levels in the project area are not expected to change under the No Action since most of the turbidity is related to wave activity and erosion of the shoreline.

Warmer temperatures would contribute to reduced dissolved oxygen and increased frequency of algal blooms, which can create toxic conditions for aquatic species. Summer droughts may amplify these effect, while periods of extreme rainfall can further degrade water quality through increased sedimentation, erosion, turbidity, nutrient loading and pollutant-laden run-off (EPA 2016).

Alternative 2

Changes to water quality parameters such as temperature, salinity, and dissolved oxygen from the proposed action are not expected to occur as a result of beach placement or pipeline installation or removal.

Construction activities may cause temporary increases in turbidity in the immediate vicinity of the discharge location. These conditions will cause temporary increases in TSS but is not expected to differ significantly from normal TSS levels in the surf zone during discharge and would return to baseline conditions after discharge at the site is complete. The USACE intends to request a waiver from the Texas Commission on Environmental Quality (TCEQ) standard threshold of dredged effluent having less than 300 milligrams per liter of TSS in areas where nourishment activities are ongoing.

In 2017, a contaminant assessment report was completed for the Galveston Harbor and Channel and the Houston Ship Channel for compliance with EPA Ocean Dumping Regulations (40 CFR Part 227 Subpart B). During the assessment it was noted that the elutriate exceeded the EPA acute Water Quality Criterion (Criterion Maximum Concentration [CMC] for ammonia. While the exceedance would not cause a water quality violation, the dilution required to meet the CMC was calculated at 1.44. The dilution curve indicated that the Suspended Particulate Phase (SPP) concentration fell below one percent by 150 minutes after discharge, which allows the ammonia CMC to be easily met within the four hours required by RIA. Based on the findings, the Limiting Permissible Concentration (LPC) for the liquid and suspended particulate phases are met, indicating no toxicity to sensitive marine water-column organisms is expected during placement and no special handling or management requirements during discharge.

Temporary pipeline routes would run near the highest point of the un-vegetated beach and/or be submerged off-shore 1,000 to 2,000 feet parallel to the shoreline, then routed perpendicular to the beach with the effluent from the dredge discharge pipe directed toward the nourishment/containment area and relocated as each section of beach is finished. Placement of dredged material on the beach would occur inside of a temporary toe berm, where dredge slurry would be placed within the contained area. Dozers would be used to create dikes from existing material or the start of pumped material to control the discharge slurry and keep the flow within the template long enough for the material to fall out of suspension from the slurry. The dredged material delivery pipeline would be lowered into place from tugboats and would be held in place by its own weight. These BMPs significantly reduce the discharge of material outside the containment area and into adjacent waters.

Biological Communities

No Action

A barrier island, such as Galveston Island, is a dynamic feature that naturally undergoes erosion of the beach and dune from the seaward side and accretion on the back side of the island. In this way, the island essentially “moves” with changing sea states. It is this ability to adapt that allows these features to persist. However, development along the Reach 1-3 shoreline prevents this natural erosion/accretion cycle from occurring; therefore, sand will be progressively lost at approximately 4 to 5 feet per year and not replenished naturally. The No Action alternative would allow for continued erosion of the project area beaches and may result in progressive loss and possible elimination of the remaining beach and dune habitat and the invaluable ecological services these areas provide. Most notably, loss of beach would threaten foraging and nesting habitat for sea turtles, shorebirds and seabirds that frequent the project area.

Additionally, armoring measures, such as construction of seawalls, may be undertaken by property owners, the State, or the Federal government in the absence of nourishment, which would further reduce the available dune habitat and result in negative impacts to biological communities.

Alternative 2

The project area is located on eroding beachfront areas and does not impact existing dunes, dune vegetation, highly valued dune swale wetlands, other wetland areas, or special aquatic sites. Onshore placement and shaping activities to construct the proposed berm and anchoring of the pipelines would temporarily, adversely impact the biological communities that forage on and inhabit the beach, including benthos, infauna and shorebirds. After construction is complete adverse impacts would cease and recolonization would occur. Over the longer-term, beach nourishment would create a wider and more stable environment thus improving the suitability and productivity of available beach habitats. Relative to the No-Action Alternative, the benefits of beach nourishment acting as a barrier against RSLC, dampening shoreline erosion, and improved habitat are expected to outweigh short-term construction impacts.

Benthic and Infaunal Community

Placement of dredged material onto the berm and the temporary anchoring of a pipeline in the nearshore environment would cause a temporary impact to the benthic and infaunal communities within the footprint of the pipeline and berm through direct burial, crushing by heavy equipment or anchoring activities, or removal of invertebrates. Larger and more mobile organisms are more likely to leave the area during construction, while the less mobile or sessile organisms would likely be buried by sand. Even some motile organisms or those able to burrow still have the potential to be buried by the overburden. Studies have documented that invertebrate fauna and prey species such as amphipods, polychaetes, and coquina clams recovered to pre-construction abundance following beach disturbance (National Research Council 1995, Greene 2002, Bolam et al. 2010). Additionally, both the nearshore and the backshore environment along the coast are dynamic and high energy environments which experience rapid sediment flux and recolonization in which the species that may be present are often accustomed to, which should allow for quicker recolonization. Given the abundance of this species assemblage along the coast, the temporary and minor impacts expected from the proposed action, and the recovery rate of these communities, effects of the proposed action on benthic invertebrates are expected to be less than significant.

Indirect effects of this temporary loss of intertidal community would also occur on marine and avian predators, including non-breeding shorebirds, for example due to temporary disruption to foraging patterns. Due to the size and temporary nature of the proposed beach nourishment (i.e., up to 9,000 ft long by 300 ft base on the beach), a one time placement, and the recovery rates of invertebrate population, this potential disruption to both the invertebrate community and their predators is expected to be less than significant.

Fisheries

Suspension/filter-feeding species, visual predators and other fishery and aquatic organisms could have short-term localized adverse indirect impacts caused by increased turbidity, total suspended sediments, and water temperatures and lower dissolved oxygen levels from placement of material. In general, it is anticipated that any tolerance beyond the existing dynamic and extreme conditions driven by sediment transport and fluctuating turbidity, would result in fish species avoiding the habitat and utilizing waters adjacent to the active construction zone. Any slower moving or less motile species (e.g., smaller or younger fish) unable to avoid the area may be buried by placement of material or crushed by heavy equipment shaping activities or anchoring of pipelines. Suspension/filter feeding organisms could be impacted due to clogging of the gills and feeding mechanisms which could either cause death or reduce growth and reproduction. Visual predators would have a reduced success rate at catching prey due to lower visibility levels.

Following construction activities, turbidity and suspended sediment levels, water temperature, and dissolved oxygen levels are expected to return to pre-construction conditions. These temporary and localized impacts would be minimized and controlled by implementing the best available practical techniques and BMPs during construction.

Terrestrial Community

Alternative 2 would primarily affect shorebirds through habitat avoidance and temporary loss of food sources because of material placement and heavy equipment movement in their foraging habitat. It would be expected that shorebirds would seek out other foraging habitat that is available for several miles in either direction of the placement site. Some avian species may utilize the placed material as a food source depending on the invertebrates present in the dredged material. Temporary loss of the benthic community (a food source for shorebirds) is probable, although the level of impacts is expected to be minor and temporary (see discussion above).

Alternative 2 would not affect the status of invasive species, negatively or positively. The plans and specifications include requirements for the contractor to inspect equipment and clean equipment to prevent spread of existing invasive species.

Mitigation

The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable and permanent impacts to waters of the United States. Because implementation of Alternative 2 is expected to induce temporary impacts to Waters of the U.S. but not long-term or permanent adverse impacts, no compensatory mitigation is necessary.

Protected Species

Threatened and Endangered Species

No Action

Under the No Action, the conditions described for Habitats (section [Habitats-No Action]) would also apply to Federally-listed species. As loss of coastal habitats throughout the country continues, it is likely that there will be an increase in species warranting conservation and protection over the planning horizon.

Alternative 2

The impacts described in Section [Alt 2 Habitats] would also apply to Endangered Species Act-(ESA)-listed species. A BO was issued to the NFS by the U.S. Fish and Wildlife Services (USFWS), through Consultation No. 02ETTX00-2018-F-2491, to permit USACE to perform beach nourishment on Galveston Island, Galveston County, TX under permit SWG-2007-01025. The USFWS permit authorizes the Galveston Park Board to perform beach nourishment activities along beachfront on the west end of Galveston Island, beginning at the western terminus of the Galveston seawall and extending west to the eastern boundary of Galveston Island State Park, as well as the western edge of Jamaica Beach to the west end of Pointe West Subdivision at Salt Prairie Drive. This BO addressed the effects to endangered Kemp's ridley sea turtles, piping plover, and threatened red knot in accordance with Section 7 of ESA.

USACE determined the proposed project would have no effect on the threatened West Indian Manatee, endangered Attwater's greater prairie chicken, and endangered leatherback sea turtle; thus, no coordination or contact with USFWS was necessary. USFWS concurred with USACE in their BO, dated June 17, 2019, that associated onshore activities of the proposed project may affect, but are not likely to adversely affect the endangered green sea turtle, hawksbill sea turtle, or the threatened loggerhead sea turtle. For additional details about species-specific effects, refer to the BO (Appendix C-1).

USACE determined Alternative 2 has no effect on Attwater's prairie-chicken, eastern black rail, oceanic whitetip shark, giant manta ray, or any of the four whale species due to lack of suitable habitat in the project area.

Migratory Birds

No Action

Many migratory birds are sensitive to environmental changes. Increasing temperatures, changing vegetation, loss of habitat, and extreme weather conditions lead to significant changes of the birds' preferred habitats. The ways in which migratory birds respond to these environmental changes differ across species. In general, short- and middle-distance migrating birds can adapt to climate changes more easily, whereas long distance migrants struggle with readjustment to changing temperatures (e.g., changes in annual migration rhythm) or loss of critical stopover sites and breeding/wintering habitat. It is anticipated that some bird species will adapt while others will decline in abundance, shrink in distribution, or become extinct.

Specifically, in the project area, shoreline loss will contribute to a region-wide loss of shoreline habitat critical to many migratory birds as breeding, wintering, or stopover habitat.

Alternative 2

Placement of dredged material and shaping activities are the most likely actions that would create a localized disturbance during construction that will result in avian avoidance of the area and disruption to feeding, resting and nesting/mating behavior as a result of noise, vibrations, lighting, and presence of personnel and equipment. Use of adjacent quality shoreline is expected minimizing the potential for any measurable loss of population, diversity, or abundance. These impacts will be short-term and are expected to cease once nourishment is completed.

During construction, there is a potential for harm and/or harassment of nesting migratory birds. Attempts would be made to conduct all placement activities outside of the nesting season; however, this may not be possible, due to the timing of dredge availability and the extended length of the nesting season for some species. Prior to construction commencing, if during the nesting season, nest surveys should be completed. If nests are identified, all construction activities should observe a 1,000-foot buffer of any colonial-nesting waterbird colonies (e.g., egrets, herons, ibis, pelicans); a 1,300-foot buffer for any shorebird nesting colonies (e.g., terns,

gulls, plovers, skimmers); and a 2,000-foot buffer for any brown pelican nesting colonies near the active construction site. Although unlikely in the project area due to lack of suitable nesting sites, if bald eagle nests are documented a buffer of at least 330 feet should be maintained between active construction and the nest and clearing of vegetation should be restricted within 660 feet of the nest site year-round (USFWS 2007). Coordination with USFWS should be completed prior to construction if nesting has been identified and USFWS guidelines should be followed to avoid adverse impacts to these species. By implementing these conservation measures there should be no adverse effects to migratory birds, including bald eagles.

Essential Fish Habitat

No Action

Climate-driven changes in the environment may affect the physiology, phenology, and behavior of marine fish and shellfish at any life-history stage and any of these effects may drive population level changes in distribution and abundance. Changes in ocean temperatures may shift population distribution causing predator-prey overlap, increasing predation mortality or potentially altering post-recruit abundance. The extent of population-level changes may be mediated by the capacity for individual species/populations to adapt to changes in important abiotic and biotic factors through changes in the phenology of important life-history events (e.g., migration, spawning) or through changes in organismal physiology (e.g., thermal reaction norms) of key traits such as growth and or through acclimation. Life cycle dynamics will occur in concert with climate-induced expansion, contraction, and/or shifts in the quality and quantity of suitable habitat, and different life stages may be affected differently by changes in habitat characteristics. As a result, it is anticipated that in the future species' range, distribution, and abundance will be different than it is under the existing condition and additional species and habitats may be identified as warranting protection under the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA).

Alternative 2

During onshore placement and shaping activities, anchoring of temporary pipelines in the nearshore environment and movement of vessels into and out of the project area, localized adverse impacts to water column EFH habitat and Federally managed species are anticipated. Direct and indirect impacts to managed species is dependent on the life stage of the species and their usage of the project area (i.e. eggs and larval fish will be affected to a greater extent than adults and juveniles because the older life stages have greater swimming abilities and will be able to move away from construction activities). Impacts to managed species would be similar to those described under Biological Communities for Alternative 2 and include: smothering, injury or entrainment; lowered feeding success due to turbidity, loss of benthic/prey organisms and less available foraging habitat; behavioral alterations due to sound, light, and structure; and changes to soft bottom bathymetry. However, adjacent similar habitat is available for prey and managed species to escape until construction ceases and baseline conditions return. Any loss of managed species would not be expected to affect populations of EFH species that inhabit the project area or the region.

Water quality concerns are of particular importance in the maintenance of the water column habitat. During placement, resuspended materials may interfere with the diversity and concentration of phytoplankton and zooplankton, and therefore could affect foraging success and patterns of schooling fishes and other grazers that comprise prey for managed species. Foraging patterns would be expected to return to normal at the end of placement and shaping activities.

As part of MSFCMA, any Federal agency that authorizes, funds or undertakes, or proposes to authorize, fund, or undertake an activity which could adversely affect EFH is subject to the consultation provisions of the Act and identifies consultation requirements (50 CFR Sections 600.805 - 600.930). This detailed project report and environmental assessment was prepared to serve as the EFH assessment. Since no significant adverse impacts are anticipated and the project as a whole is largely beneficial to EFH species, no mitigation was proposed.

Marine Mammals

No Action

Under changing future climate conditions, a shift in the distribution of common bottlenose dolphins is possible as temperatures and habitats change, accompanied by a shift in the distribution and abundance of prey species. There are also likely to be changes in the distribution of pathogens, so naïve populations may be exposed to new diseases. The impacts on populations will depend on their ability to adapt to change and on the continued availability of suitable resources and habitat available for the dolphins and their prey. It is assumed that any future dredging or in-water work would comply with the Marine Mammal Protection Act, which prohibits take of marine mammals and if adverse impacts are possible, mitigation would occur to minimize or compensate for the impacts.

Alternative 2

Impacts to marine mammals from implementation of Alternative 2 could arise during in-water activities occurring at the outer limits of the project area of the nearshore, such as set-up/take-down of dredged material transport pipes and operation of watercraft/vessels into and out of the project area. Impacts could include temporary habitat avoidance, exposure to underwater sound, and visual disturbances, which would all cease after construction is complete.

The most extreme impact could include entrapment and/or collision with pipes, pumps, or vessels. Many marine mammals are known to react to the movement or presence of vessels in response to the noise the vessels make or from a visual cue the animal receives and is highly dependent on the individual's reactionary behavior. Bottled nosed dolphins in the area are highly mobile and expected to easily avoid equipment. While the slow-moving West Indian manatee would be more susceptible to vessel strikes, this is highly unlikely since vessels would be moving at very slow speeds, the pipeline would be anchored to the sea floor, and implementation of the conservation measures listed below.

Marine mammals are highly vocal and dependent on sound for many aspects of life making them particularly susceptible to impacts from noise. Construction activities are expected to increase the ambient noise levels along the pipeline and at the placement site due to the presence of equipment and personnel, discharge of sediment, operation of booster pumps and other vessels at the construction site. Exposure to underwater noise, particularly continuous, low frequency sound, can be detected by marine mammals over considerable distances and could potentially impact or alter an individual's normal behavior, such as migration patterns, communication, foraging and breeding habits (Thomsen et al. 2009).

Additional conservation measures are being incorporated into the plan to avoid potential incidental harassment and "take" of marine mammals. The following mitigation measures would be implemented:

- Qualified biologists would monitor the presence of marine mammals during phases which involve open water areas capable of supporting marine mammals.
- Before activities occur in open water areas, a 50-foot radius of the work area should be delineated. If any marine mammal is observed within the 50-foot radius, the biological monitor shall halt construction activities, including shutting down any running equipment until the animal has moved beyond the radius, either through sighting or by waiting until enough time has elapsed (approximately 15 minutes) to assume that the animal has moved beyond the buffer.
- If siltation barriers are used, they will be made of material in which marine mammals cannot become entangled, should be properly secured, and regularly monitored to avoid mammal entrapment.
- No long-term adverse impacts to marine mammals are anticipated, since the alternative does not involve measures that would reduce the food base, block or limit passage to or from biologically important areas, or permanently destroy habitat. The anticipated impacts are not expected to rise to the level of significant or result in the need for NOAA to issue an Incidental Take Authorization, especially with the incorporation of the conservation measures.

Cultural Resources

No Action

Under the No Action, there would be no change in cultural resources as compared to the existing condition. Cultural resources potentially present, but not yet identified, would continue to be subjected to erosional forces and fluctuating and rising sea levels.

Alternative 2

None of the four shipwreck sites would be affected by the current undertaking. Based on the absence of recorded historic properties within the project area, the dynamic nature of the

shoreline, and significant erosion and shoreline loss, the USACE has determined that there is no potential to affect historic properties and no further coordination is required.

Socioeconomics/Economics

No Action

Under the No Action, beaches in the project area would continue to be subjected to erosional forces resulting in narrower recreational beaches and less protection to adjacent private and public properties. Local economies could be impacted through loss of property and sales tax revenue and loss of revenue to local businesses from recreational beachgoers.

Alternative 2

Implementation of Alternative 2 is not expected to have any measurable adverse or beneficial impact on local economies around the project area given the relative density of residential structures and few commercial structures. Since this is only a one-time nourishment, any benefit of protecting property from loss and the subsequent loss of revenue would only be delayed, not eliminated or reduced.

No environmental justice (EJ) communities were identified in the census tract containing the project area; therefore, no EJ communities would be adversely affected as a result of implementing the action. Under Alternative 2, a subset of the 1.7 miles of project area would be temporarily unavailable for fishing during onshore placement. Anyone depending on subsistence fishing would not be able to use the closed portion of the project area until construction in that section is complete. Due to the relatively small area of the active construction zone and availability of other areas to fish, the action would not change environmental justice conditions.

Noise, Aesthetics and Recreation

No Action

Under the No Action, erosion would continue to result in loss of recreational beaches creating a narrow beach that may at some point only become accessible during low tide and make it harder for beach goers to seek solitude away from other recreationists. The loss of dry beach may also be visually unappealing for private property owners or recreationists who often expect to see sandy beaches when they seek a coastal or ocean view.

Alternative 2

The proposed work would have a temporary adverse impact upon the aesthetics and recreational value of the site, caused by the presence of small machinery on-site and presence of booster pumps and work vessels. During construction, noise generated by the dredge and booster pumps would be offshore and should be of sufficient distance to not impact those living

near or recreating on the beaches. Noise generated by equipment shaping the beach in the vicinity of the discharge pipe would be relatively localized (noise audible up to 800 feet from the active construction site), low level and of short duration resulting in a temporary reduction in aesthetics and potentially diminished recreational experience that would return to baseline conditions once construction is complete. Many visitors would seek adjacent beaches for quieter areas for fishing, swimming and sunbathing. Additionally, construction equipment would be properly maintained to minimize the effects of noise.

Hundreds of feet of dredged pipe lying on the beach or just offshore would have a negative visual impact on the aesthetics of the area, as well. This impact would be temporary and return to baseline conditions once the pipe is removed upon completion of the work. The negative visual impacts of the equipment and pipe would be offset to an extent by the natural curiosity of some individuals to see what is going on and how work is progressing. Once completed, the project would result in an overall improved aesthetic and recreation quality. Beach nourishment would restore the natural appearance of a wider beach which is considered pleasing to observers and beachgoers.

During construction, use of the beach in the vicinity of the active construction zone would be temporarily restricted for public safety. As portions of the renourished beaches come available, use by the public could resume and are expected to return to pre-construction activity levels. The public would be more inclined to use the nourished beaches rather than by-passing them for others with more sand above the high tide line. Additionally, a nourished beach would increase suitable habitat for shorebirds and wading birds, thus increasing the bird watching opportunities in the project area.

Hazardous, Toxic and Radioactive Waste

No Action

Under the No Action, the existing condition is anticipated to remain the baseline condition through the planning horizon.

Alternative 2

Despite the lack of identified sites that could be reasonably expected to affect Alternative 2, there is always a possibility that previously unidentified HTRW could be uncovered, even when a proposed project is entirely within a preexisting project footprint. Care should be taken as the project progresses to identify and address HTRW concerns that may arise in a timely manner so as not to affect the proposed project.

The maintenance material from the Galveston Harbor and Channel is considered to be of acceptable quality and free of any of the prohibited materials listed in 40 CFR Part 227, Subparts B (227.5 (a-d) or 227.6 (a) (1-5)). Material from the channel has, to date, been evaluated several times using bioassay and bioaccumulation procedures. The results of historic chemical and grain size analyses, solid phase bioassays, and bioaccumulation assessments

indicate no unacceptable adverse impacts will occur as a result of dredging and dredged material placement operations. While some constituents listed in the “constituents prohibited as other than trace contaminants,” such as organohalogens, carcinogens, mutagens, and teratogens, are not tested for nor are they historically known to be present in the Galveston Harbor and Channel.

4.4. Comparison of Final Plans

Both the focused alternatives meet the criteria of only one placement on public access beaches, have BUDM benefits, and avoid impacts to sea turtles and shore birds to qualify for the final comparison of the National Economic Development Objective of benefits over cost. Both Alternatives 2 and 3 meet the criteria of economic justification, environmental factors, completeness, and effectiveness to be constructed under the authority of Section 204. As Alternative 2 has the greatest excess benefits over cost as well as providing direct erosion protection to the most vulnerable development within the study area including Highway 3005, an essential evacuation route; it is the most effective and acceptable plan. Alternative 2 is selected as the Tentatively Selected Plan. See below attached: Table 1, Plan Costs; Table 2, Benefit-Cost Comparison; and Figure 12, Alternatives 2 and 3. See Appendix B for Cost information.

Alternative 2 is the TSP as it has the greatest CSRSM benefits over cost making it the plan meeting the National Economic Development (NED) Objective. Life safety benefits would be similar for both Alternatives 2 and 3 as would Environmental Quality (EQ), Regional Economic Development (RED), Other Social Effects (OSE), monetary and non-monetary benefits, and primary versus incidental benefits. See Appendix E for economic benefits and additional economic information.

Table 1. Plan Costs

**Cost for Alternative Plans (rounded)
By Code of Account
FY 2022 Price Level**

Total Project Cost Includes 26% contingency	Alt 1 FWOP	Alt 2	Alt 3
Construction Cost			
01 Real Estate		\$74,000	\$74,000
12 Navigation	\$5,567,000	\$14,753,000	\$14,913,000
30 Eng & Design	\$557,000	\$1,477,000	\$1,489,000
31 Const Mgmt.	\$333,000	\$885,000	\$893,000
Total Project Cost, rounded	\$6,457,000	\$17,188,000	\$17,370,000
INCREASED PROJ COST		\$10,732,000	\$10,912,000

Table 2. Benefit-Cost Comparison

Beneficial Use of Dredge Material - §204	Alternative 2	Alternative 3
FY2022 Total First Cost	\$10,732,000	\$10,912,000
IDC - @ 2.25%	\$19,900	\$20,300
2022 Total Investment	\$10,751,900	\$10,932,300
Capital Recovery Factor - 24 years	0.0544	0.0544
FY2022 Annual Costs for 24-Year Period of Analysis	\$585,000	\$595,500
Annual Land Loss Avoided	\$2,452,300	\$ 2,452,300
Annual Recreation Benefits	\$51,900	\$51,900
Annual Structure Benefits	\$784,800	\$607,400
Total Annual Benefits for 24-Year Period of Analysis	\$3,289,000	\$3,111,600
Net Annual Benefits	\$2,704,000	\$2,516,000
Benefit-Cost Ratio	5.6	5.2

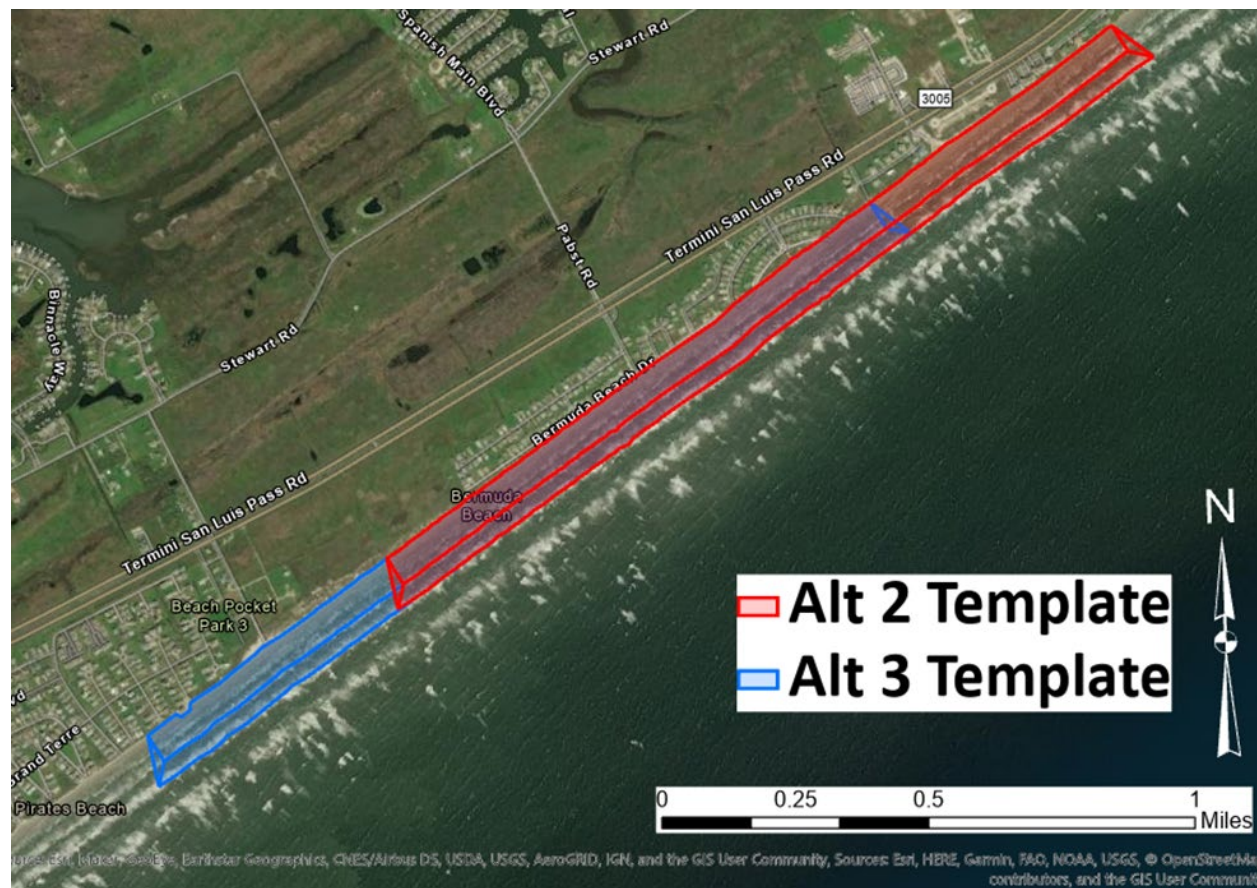


Figure 12. Alternatives 2 and 3 Template

5 Tentatively Selected Plan / Recommended Plan Description

Alternative 2: Dredged material is brought to the west end of the public use Galveston Beach by hopper dredge and pumped by a pipeline for beach placement beginning at Sunbather Lane and extending for 1.7 miles west, a measure for beach erosion control for the purpose of hurricane and storm damage reduction.

Costs for the Section 204 beneficial use project are measured as the increase in cost for direct beach placement of the dredged sand above the cost of the Federal Base Plan for ocean placement. The increased cost for construction of the beach nourishment plan is estimated at \$11,740,000 fully funded. The 35 percent non-Federal share of the §204 project is estimated at \$4,109,000. The 65 percent Federal share would be \$7,631,000 for the purpose of coastal storm damage reduction. With the \$450,000 Federal expenditure for the project study, the total Federal cost expenditure of \$8,081,000 does not exceed the \$10,000,000 per project Federal expenditure limit.

Benefits for the increased beach fill include temporarily delaying the loss and damage of the protected private developed properties of land loss, structural damages and recreation activities for the 24-year period of analysis without providing a specific level of service. The incremental

construction cost of beach nourishment is \$10,751,900 or \$585,000 (annualized) Net annual benefits amount to \$2,704,000 yielding a Benefit- to- Cost Ratio of 5.6 to one. These benefits indicate a positive National Economic Development plan for beneficial use of dredged material to provide coastal storm damage risk reduction in the City of Galveston, Texas. See Figure 13 below of the graphic exhibiting existing, design, and post construction profiles based on beach equilibrium concepts.

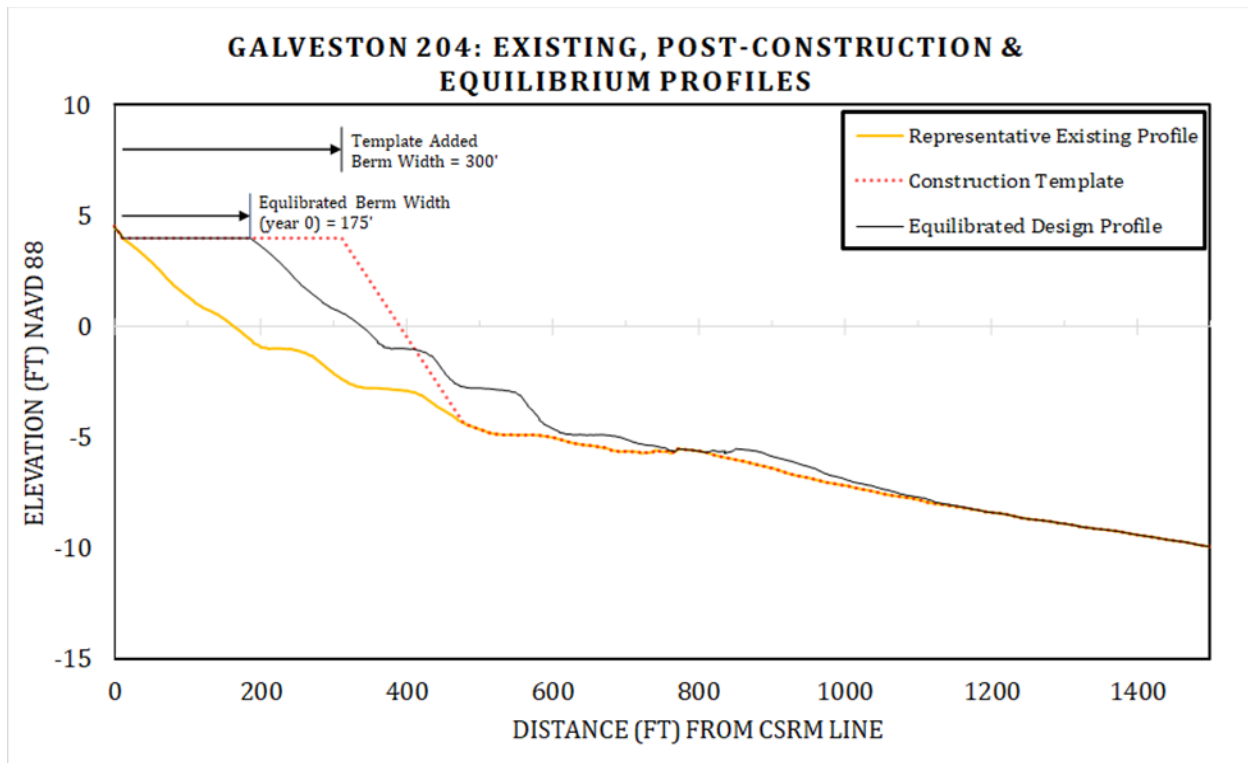


Figure 13. CSRM-Coastal Storm Risk Management Line

The analysis indicates that beach nourishment for Galveston Island is feasible, environmentally acceptable, and economically justified. This report concludes that there is Federal interest in proceeding with implementation of a project for the beneficial use of dredged material from Galveston Harbor and Channel under the authority of Section 204 of the Water Resources Development Act (WRDA) of 1992 (33 USC Sec. 2326), as amended. The tentatively selected plan is to bring dredged material to the west end of Galveston Beach transferred to a pipeline dredge for beach placement beginning at Sunbather Lane and extending 1.7 miles west.

6 Environmental Operating Principles

Systems / Watershed Context

The TSP is integrated with other watershed purposes of recreation and continues to provide habitat for migratory birds, foraging seabirds, and nesting sea turtles while not impacting cultural resources.

Environmental Operating Principles

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

The TSP, Alternative 2, supports the USACE Environmental Operating Principles. The diverse disciplines of the project team including NonFederal stakeholders complied with policy and statutory law in formulating the TSP. Science was employed to formulate economic, social, and environmentally sustainable solutions while using risk management considerations for the project life cycle. The TSP and its selection process will be provided to the public for review.

7 Key Social and Environmental Factors and Mitigation Actions

Stakeholder Perspectives and Differences

Public meetings were held in March 2022 in which stakeholders' provided their perspectives on BU placement further west than Babe's Beach. The GLO and City of Galveston expressed their support to place sand on west end beaches (seaward of West Grand and Riviera condominium towers) citing its importance to protect homes and infrastructure from erosion. The GLO and City also recognized that it is imperative to maintain an unencumbered ship channel and to not jeopardize the authorized navigation mission. The Port of Houston, Port of Texas City, Port Galveston, and the Galveston and Harbor Pilots also expressed support of BUDM generally but required assurances there would be no cost increase to any portion of the Federal O&M dredging contract. Additionally, they expressed the desire for the project to be completed within the time allotted and requested that the schedule would not be expanded for BU placement westward of Babe's Beach. The concerns from the port and pilot groups were that the O&M costs and the duration to clear the channel would increase because of the distance needed to travel to place material at the BU location. They highlighted that this could result in draft restrictions in the navigation channel, potentially creating an unsafe, unreliable, and inefficient channel for commerce movement. They also agreed with the risks identified to the federal contract.

Another meeting was held with dredging contractors and owner operators of trailing suction hopper dredges to gain insight from the industry on the BU placement, which included representatives from Manson, Dutra, Weeks Marine, and Great Lakes Dredge & Dock

Corporation. A presentation was given to provide an overview of the project, in which individual discussions followed. All members were posed the same questions and given the opportunity to provide additional suggestions or concerns for the project. All attending members were asked:

- Question: Would expanding the disposal area by five miles to the west, effectively creating a 10-mile round trip, with the same expected performance period as the BU placement at Babe's Beach (60 days and 950,000 c.y. of material), reduce the number of hopper dredges needed to economically perform the work?

Response: Three of the four contractors did not express concern with the increase in sail time, while two contractors noted new dredges that were under construction that would add more capability to their fleet.

- Question: Is there additional dredging equipment needed to perform the work, such as equipment to connect submerged pipeline further offshore, and/or booster equipment?

Response: Three of the four contractors did not believe additional equipment would be necessary because of the similar depth conditions in the proposed placement area. The fourth contractor was under the assumption there would be a need for 12,000-15,000 feet of subline, but did not have access to a navigational chart at the time of the meeting.

In general, dredgers expressed concerns with the ability to bid on the proposed work. All of the contractors acknowledged the reduced Performance Period was a concern, but indicated they had the sufficient capacity to dredge and nourish the placement area in the required timeline. However, one contractor expressed their concern that the reduced Performance Period (PP) would reduce competition to only include larger dredges, thereby limiting competition. Another contractor indicated their only accessible dredged would be available after September 2022. The remaining two contractors would not commit to having equipment available but did not express concerns with being able to submit a bid for the proposed work with their available fleet.

All contractors acknowledged the increased sail time beyond the Babe's beach placement area. One contractor felt it would be a minimal impact, while the other three contractors indicated it would likely result in a 20%-30% sail time increase with corresponding cost increases and reduction in daily production. One of the contractors that expressed the further west placement area would result in a 20% increase in sail time, indicated their ability to do the work within the PP with two smaller dredges. The contractor noted that a larger dredge would be more efficient; however, that two smaller dredges could do the work at a slightly higher cost.

Following the public review of the draft DPR/EA, comments of key perspectives and differences among stakeholders will be described with the responses added to the final report. The views of resource agencies and how concerns were addressed will be presented to include actions taken to resolve issues and proposed actions to address any unresolved issues.

Environmental Compliance

This DPR/EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations and has been prepared using the Council on Environmental Quality (CEQ) 2020 NEPA regulations (40 CFR Part 1500–1508) and the USACE’s regulation ER 200-2-2 – Environmental Quality: Policy and Procedures for Implementing NEPA, 33 CFR 230. In implementing Alternative 2, the USACE would follow provisions of all applicable laws, regulations, and policies related to the proposed actions. The status of compliance of the project with the most common laws applicable to USACE studies is presented in Table 3.

Table 3. Environmental Compliance of the TSP

Policies	Compliance Status	Notes
Public Laws		
Abandoned Shipwreck Act of 1988, as amended	Not Applicable	
Archeological and Historic Preservation Act of 1974, as amended	In Progress	
Bald and Golden Eagle Protection Act of 1940, as amended	Compliant	Section [Alt2 Migratory Birds]
Clean Air Act of 1970, as amended	Compliant	Section [Alt 2 Air]
Clean Water Act of 1972, as amended	Compliant	Appendix C
Coastal Barrier Resources Act of 1982, as amended	Not Applicable	
Coastal Zone Management Act of 1972, as amended	In Progress	Appendix C
Endangered Species Act of 1973, as amended	In Progress	Section [Alt 2 T&E], Appendix C
Farmland Protection Policy Act of 1981	Not Applicable	
Fish and Wildlife Coordination Act of 1934, as amended	In Progress	Appendix C
Magnuson-Stevens Fisheries Conservation and Management Act of 1976, as amended	In Progress	Section [Alt 2 EFH]
Marine Mammal Protection Act of 1972, as amended	Compliant	Section [Alt 2 Marine Mammals]
Marine Protection, Research, and Sanctuaries Act of 1972, as amended	Not Applicable	

Policies	Compliance Status	Notes
Migratory Bird Treaty Act of 1918, as amended	Compliant	Section [Alt 2 Migratory Birds]
National Environmental Policy Act of 1969, as amended	In Progress	
National Historic Preservation Act of 1966, as amended	In Progress	Section [Alt 2 Cultural]
Native American Graves Protection and Repatriation Act of 1990	Not Applicable	
Rivers and Harbors Act of 1899, as amended	Compliant	Section [Federal Navigation Project] .
Wild and Scenic Rivers Act, as amended	Not Applicable	
Executive Orders		
Environmental Justice (E.O. 12898)	Compliant	Section [Alt 2 Socioecon]
Flood Plain Management (E.O. 11988)	Compliant	Section [Alt 2 Hydro]
Protection of Wetlands (E.O. 11990)	Compliant	Section [Alt 2 Habitats]
Protection of Children from Environmental Health Risks (E.O. 13045)	Compliant	Section [Alt 2 Socio]
Invasive Species (E.O. 13751)	Compliant	Section [Alt 2 Wildlife/Fisheries]
Migratory Birds (E.O. 13186)	Compliant	Section [Alt Migratory Birds]

8 References

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9 Costs and Benefits

9.1 Project Costs

Under Section 204 authority, feasibility costs are 100 percent Federal. Design and construction phase costs are cost-shared with the sponsor at rates based on the purpose of the beneficial use (in this case coastal storm risk management) and the benefits derived. Base plan costs were subtracted from the beneficial use alternatives costs to determine Section 204 project costs. As all protected properties and all identified benefits are to private lots developed for residential and small business use, Federal and non-Federal costs were apportioned at a 65/35 rate. The full project cost assigned to the beneficial use project, including the Section 204 design costs, was used for computing the Section 204 project costs, annual costs, and for benefit-cost analysis. The project cost estimate summaries are provided in Appendix B. See the following: Table 4. Cost Summary for the Section 204's total first costs.

Table 4. Cost Summary, (October 2021 Price Levels)

Construction Item	Cost
Lands & Damages	\$74,000
Navigation	\$14,753,000
Preconstruction Engineering & Design (PED)	\$1,477,000
Construction Management (E&D, S&A)	\$885,000
Base Plan, FWOP	-\$6,457,000
Total First Cost	\$10,732,000

9.2 Equivalent Annual Costs and Benefits

The Non-Federal share is \$4,109,000 that is 35 percent of the \$11,740,000 BUDM fully funded project cost. The Federal share is \$7,731,000 (65%). Total real estate costs are \$77,000, of which sponsor's real estate cost is \$45,000 and its cash share is \$4,064,000. See the cost sharing responsibilities in Table 5.

Table 5. Cost Sharing for Coastal Storm Risk Management (CSRM) (October 2021 Price Level)

Item	Federal Cost	Non-Federal Cost	Totals
CSRM Cost	\$7,599,000	\$4,064,000	\$11,663,000
Real Estate	\$32,000	\$45,000	\$77,000
Construction, ED, SA & Real Estate	\$7,631,000	\$4,109,000	\$11,740,000
Federal Feasibility Cost	\$450,000		
Federal Limit (\$10,000,000)	\$8,081,000		
Non-Federal Additional Cash Share Required	\$0	\$0	
Total Non-Federal Share		\$4,109,000	

10 Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R)

Project does not require OMRR&R as work is done primarily on a single, one-time basis.

11 Real Estate Requirement

A Real Estate Plan is included as Appendix D. The report describes the interests required for project implementation and identifies the properties involved, their value, and ownership. A Temporary Work Area Easement must be secured for all areas needed for access and staging for construction equipment and operations.

12 Project Implementation

As of May 3, 2022, the City of Galveston is the non-Federal sponsor (See Attachment 2) for project implementation, with assistance provided by the Texas General Land Office (GLO). GLO has actively participated in the feasibility study. GLO is to enter into a Project Partnership Agreement (PPA) with the City of Galveston for financial participation in the project construction. It is understood that GLO through the State of Texas, will protect the public easement (the wet and/or dry beach seaward of the vegetation) and its use from erosion or reduction caused by development or other activities on adjacent land including beach cleanup and maintenance.

Timeline

Public Review: August 11- September 9, 2022
Feasibility Report Approval: 27 January 2023
Execute Project Partnership Agreement: 10 April 2023
Construction Award: FY 2024

Above timeline, considers that the results of the Galveston District market research determines that capable dredging equipment is available to execute the work (bid the contract) prior to requesting § 204 project funding. Also required is that the § 204 project funding is secured in advance of the scheduled maintenance dredging and that awardable contractor bids are received.

Implementation Risk

Implementation of the selected plan to dispose dredged material west of the end of the Galveston Island seawall risks adverse impacts to the Federal Navigation Project.

- a. The selected plan increases roundtrip sail distance from the ODMDS ~ 30 miles.
- b. Operations is partnering with the Texas GLO and the Galveston Park Board for BUDM at 61st and west (~ +20 miles).
- c. This project would increase the total sail above the current BUDM site by 10 miles.
- d. Under the current partnership between USACE, GLO and the Park Board, our hopper dredge contractors are achieving ~3.5 loads per day with disposal to the 61st street location.
- e. The additional § 204 project distance reduces productivity to ~2 to 2.5 loads per day, an increase in contract duration by ~20 percent.
- f. This increases the time to clear shoaling from the Houston/ Galveston Entrance Channel. Draft restrictions during dredging will take 20 percent longer to clear.
- g. Any draft restrictions during dredging would require project's BUDM to be delayed or reduced.
- h. With increased sail distance, only four Contractor trailing suction hopper dredges are estimated to be capable of effectively executing the work (i.e. bid the contract).
- i. Delay of BUDM placement to next O&M cycle could result in cost risk, which can result in not implementing the § 204 project under this study and/or decrease erosion delay protection.

- j. Choice of dredging method could increase the § 204 project cost. The project sponsor has indicated its willingness and ability to pay the incremental project costs above the base plan costs that might exceed the Federal \$10,000,000 expenditure limit.

As determined through discussions with the NonFederal Sponsors of the Federal Navigation projects and Industry, the § 204 project will reduce the number of single hopper dredging plants that can perform the work, and/or cause the contractors to utilize two dredges to perform the work as to not increase the time associated with clearing critical shoaling from the navigation channel. This will inadvertently reduce competition for available hopper dredges and cause an increase in project costs. However, industry indicated that several hopper dredge plants are currently in production to be brought online over the next few years, and several more are in the design phase for the outer years. The addition of Hopper dredges could allow for later mitigation to the risks to the O&M of the Federal Navigation projects and the § 204 project.

Federal Responsibilities

The Federal government will be responsible for preparation of plans and specifications and contract advertisement, award and supervision and inspection of the work. The Federal government will be responsible for project compliance with Federal environmental laws and regulations, including the NEPA, ESA, consistency with the Coastal Zone Management Act (CZMA), and the CWA.

Non-Federal Responsibilities

Federal implementation of the project for coastal risk management includes, but is not limited to, the following required items of local cooperation to be undertaken by the non-Federal sponsor in accordance with applicable Federal laws, regulations, and policies:

- a. Provide 35 percent of construction costs allocated by the Federal government to coastal storm risk management; 100 percent of construction costs allocated by the Federal government to beach improvements with exclusively private benefits; 100 percent of construction costs allocated by the Federal government to improvements and other work located within the Coastal Barrier Resources System that the Federal government has determined are ineligible for Federal financial participation; and 100 percent of construction costs allocated by the Federal government to the prevention of losses of undeveloped private lands, as further specified below:

1. Provide, during design, 35 percent of design costs in accordance with the terms of the project partnership agreement entered into prior to commencement of design work for the project;

2. Provide all real property interests, including placement area improvements, and perform all relocations determined by the Federal government to be required for the project;

3. Provide, during construction, any additional contribution necessary to make its total contribution equal to at least 35 percent of construction costs;

b. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) that might reduce the level of coastal storm risk reduction the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

c. Inform affected interests, at least yearly, of the extent of risk reduction afforded by the project; participate in and comply with applicable Federal floodplain management and flood insurance programs; prepare a floodplain management plan for the project to be implemented not later than one year after completion of construction of the project; and publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with the project;

d. Operate, maintain, repair, rehabilitate, and replace the project or functional portion thereof at no cost to the Federal government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal laws and regulations and any specific directions prescribed by the Federal government;

e. At least annually and after storm events, at no cost to the Federal government, perform surveillance of the project to determine losses of material and provide results of such surveillance to the Federal government;

f. For shores, other than Federal shores, protected using Federal funds, ensure the continued public use of such shores compatible with the authorized purpose of the project;

g. Provide and maintain necessary access roads, parking areas, and other associated public use facilities, open and available to all on equal terms;

h. Give the Federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal sponsor owns or controls for access to the project to inspect the project, and, if necessary, to undertake work necessary to the proper functioning of the project for its authorized purpose;

i. Hold and save the Federal government free from all damages arising from design, construction, operation, maintenance, repair, rehabilitation, and replacement of the project, except for damages due to the fault or negligence of the Federal government or its contractors;

- j. Perform, or ensure performance of, any investigations for hazardous, toxic, and radioactive wastes (HTRW) that are determined necessary to identify the existence and extent of any HTRW regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, and any other applicable law, that may exist in, on, or under real property interests that the Federal government determines to be necessary for construction, operation and maintenance of the project;
- k. Agree, as between the Federal government and the non-Federal sponsor, to be solely responsible for the performance and costs of cleanup and response of any HTRW regulated under applicable law that are located in, on, or under real property interests required for construction, operation, and maintenance of the project, including the costs of any studies and investigations necessary to determine an appropriate response to the contamination, without reimbursement or credit by the Federal government;
- l. Agree, as between the Federal government and the non-Federal sponsor, that the non-Federal sponsor shall be considered the owner and operator of the project for the purpose of CERCLA liability or other applicable law, and to the maximum extent practicable shall carry out its responsibilities in a manner that will not cause HTRW liability to arise under applicable law; and
- m. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, (42 U.S.C. 4630 and 4655) and the Uniform Regulations contained in 49 C.F.R Part 24, in acquiring real property interests necessary for construction, operation, and maintenance of the project including those necessary for relocations, and placement area improvements; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act.

13 Recommendation

The recommendation of this investigation is that placement of dredged material from maintenance dredging of the Galveston Harbor and Channel, a Federal navigation project, be beneficially used under the Continuing Authority of Section 204 of the Water Resources Development Act (WRDA) of 1992, as amended by Section 2037 of WRDA 2007, as beach fill at Galveston Island, Texas. The beach fill would be used to widen and increase the elevation of the beach at Sunbather Lane for approximately 1.7 miles west to provide a period of erosion protection to shorefront properties.

The non-Federal Sponsor, the City of Galveston, Texas, is capable and willing to execute a Project Partnership Agreement with the Government for construction and future maintenance of the project as the non-Federal Sponsor.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for authorization and implementation funding. However, prior to transmittal to higher authority, the sponsor, the states, interested federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

Date

COMMANDER
Colonel, US Army
District Engineer

14 List of Preparers

- 1** Reuben Trevino – Project Manager
- 2** Julia Smethurst – Planning
- 3** Brandon Ford – Environmental
- 4** Melanie Fisher – Environmental
- 5** Raven Blakeway – Environmental
- 6** John Campbell – Cultural Resources
- 7** Jason Thies – H&H Engineering
- 8** Mason McGown – Cost Engineering
- 9** Luke Prendergast – HTRW
- 10** Nichole Schlund – Real Estate
- 11** Arden Sansom - Economics
- 12** James Purcell – Office of Counsel
- 13** Andrew Cook – Operations
- 14** Chris Frabotta - Operations

Attachment 1 – Sponsor’s Letter of Study Request



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November 23, 2020

Colonel Timothy Vail
Galveston District, U.S. Army Corps of Engineers
2000 Fort Point Road
P.O. Box 1229
Galveston, TX 77550

Dear Colonel Vail:

The Park Board of Trustees of the City of Galveston (Park Board) is seeking opportunities for a system-based approach to managing sediment resources in our region. Galveston Island is a "sand limited" system, with a minimal supply of new sand. The area has no nearshore source of sand for nourishment projects, and therefore, is a good fit for beneficial use of dredged material projects using the sediment from the ongoing operations and maintenance of the nearby Houston-Galveston Ship Channel. In 2016, the Park Board worked with the Engineering, Research and Design Center (ERDC) of the Army Corps of Engineers through the Planning Assistance to States program to develop a 50 Year Sand Management Plan which highlighted the beneficial use of dredged material as a principal strategy.

The Park Board requests that the Army Corps of Engineers investigate the possibility of implementing this principal strategy under its Section 204(d) Water Resources Development Act of 1992, as amended Regional Sediment Management (Beneficial Uses of Dredged Material) Continuing Authorities Program to formulate a series restoration projects for the shoreline west of the Seawall along the Island's West End. The dredged material from the routine maintenance of the Houston-Galveston Entrance Channel is considered beach quality sand and should be used to consistently address the island's on-going erosion.

The requested project would have a significant public safety and storm protection benefits for the community. Results could have lasting impacts through future shoreline protection projects that would protect against loss of life and damage to improved property. The Galveston Seawall, built following the largest disaster in U.S. history, helps protect a significant portion of Galveston Island from coastal flooding and storm surge. Although the Seawall was designed to stand alone, it is susceptible to flanking. The presence of a wide beach seaward of the Seawall helps protect this infrastructure and preserve the residential, commercial, environmental, and other assets located behind the structure.

The Park Board is committed to serving as the local sponsor for the Section 204(d) Continuing Authorities Program and understands the cost-sharing requirements for the project moving forward after the determination of federal interest per EP 1105-2-58, Section 33, Paragraphs b.(2), (3) and (5), and Section Paragraph C. We are aware of public use and access requirements and are prepared to provide all Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas (LFRDs) if needed (see

**Attachment 2 – Sponsor’s Letter of Project Sponsorship
and Acknowledgement of Cost Share Responsibility**



City of Galveston

OFFICE OF THE CITY MANAGER

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citymanager@galvestontx.gov | 409-797-3320

May 3, 2022

Colonel Timothy Vail
Galveston District, U.S. Army Corps of Engineers
2000 Fort Point Road
P.O. Box 1229
Galveston, TX 77550

Dear Colonel Vail:

The City of Galveston is committed to growing and strengthening the relationship forged between the United States Army Corps of Engineers Galveston District and our community. In close coordination with the Galveston Park Board of Trustees we are beginning the next chapter of our communities' role in regional sediment management and resiliency efforts.

This letter is to notify you that the City of Galveston has assumed the role of non-federal sponsor for the Galveston BUDM Project under the Section 204(d) Continuing Authorities Program.

We appreciate the effort and organization that you and your staff have poured into this project and we commit to continuing to serve as engaged partners. We understand that stepping into this position may require additional financial contributions to aid in bringing the project into fruition. We along with our partners in the GLQ remain willing and able to facilitate the funding of incremental cost which may arise through future approvals by our Industrial Development Corporation.

Please contact Brandon Hill at bhill@galvestontx.gov for further information or assistance.

Thank you

Brian Maxwell
Galveston City Manager

CC Kelly de Schaun, Chief Executive Officer, Galveston Park Board of Trustees

